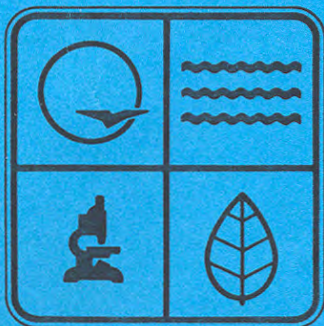
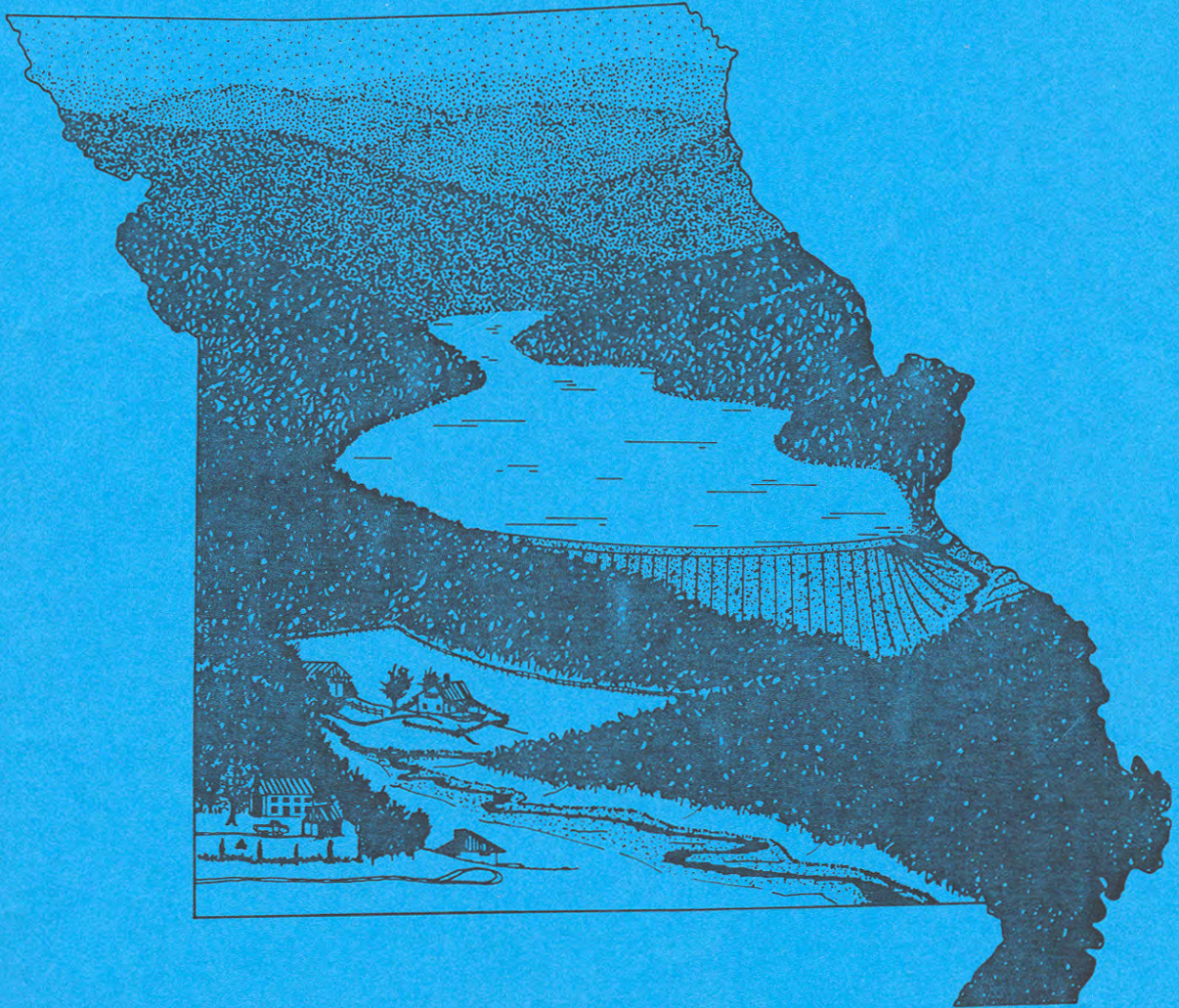


Rules and Regulations of the Missouri Dam and Reservoir Safety Council

Revised 1985



MISSOURI DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGY AND LAND SURVEY
DAM AND RESERVOIR SAFETY PROGRAM
P.O. Box 250, Rolla, MO 65401

RULES AND REGULATIONS OF THE MISSOURI DAM AND RESERVOIR SAFETY COUNCIL

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Wallace B. Howe, Director and State Geologist, P.O. Box 250, Rolla, MO 65401

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January 1985

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INTRODUCTION

The Dam and Reservoir Safety Council and the Dam and Reservoir Safety Program within the Missouri Department of Natural Resources were established by House Committee Substitute for House Bill 603 as passed by the first regular session of the 80th General Assembly. The bill was signed by the Governor and subsequently became law on September 28, 1979. This law is Sections 236.400 through 236.500 in the Revised Statutes of Missouri as printed in the 1980 Supplement. The Dam and Reservoir Safety Program was assigned to the Division of Geology and Land Survey within the Department of Natural Resources for administration.

The Governor began appointment of the first Council during April of 1980. Employment of the Chief Engineer and initiation of recruitment for the additional authorized staff commenced in July 1980. A working Council with a quorum of four members had been appointed by September 1980.

From September 1980 to August 1981 the Council, with help from the Chief Engineer and his staff, promulgated the first set of rules. These rules provide the information that is necessary in order to implement the law. These rules became effective on August 13, 1981 and are contained in the Code of State Regulations under Title 10, Division 22, Chapters 1 through 3.

In June 1984, the seventh member of the Council was appointed by the Governor, and the first full seven member council meeting was held in July 1984. From January 1984 to December 1984, the Council, with help from the Chief Engineer and his staff, revised the August 13, 1981 edition of the rules. These revisions became effective on January 1, 1985 and are contained in the Code of State Regulations under Title 10, Division 22, Chapters 1 through 4.

The Dam and Reservoir Safety Council is a non-paid policy-making body appointed by the Governor with the consent of the Senate. Communication with the Council is normally handled through the paid staff which is directed by the Chief Engineer. Questions, comments, requests and other inquiries should be addressed to the Chief Engineer for action or referral to the Council. The Chief Engineer may be contacted at the following address or telephone number:

Chief Engineer
Dam and Reservoir Safety Program
Missouri Department of Natural Resources
Post Office Box 250
Rolla, Missouri 65401-0250
(Telephone) 314-364-1752

CODE OF STATE REGULATIONS—RULES
Title 10 — DEPARTMENT OF NATURAL RESOURCES
Division 22 — Dam and Reservoir Safety Council
Chapter 1 — Organization, Definitions and Immunity

10 CSR 22-1.010 General Organization

PURPOSE: The purpose of this rule is to comply with section 536.023, RSMo (1978) which requires each agency to adopt as a rule a description of its operation and the methods whereby the public may obtain information or make submissions or requests.

(1) Section 236.410, RSMo (Supp. 1980) establishes a Dam and Reservoir Safety Council of the state of Missouri. The council consists of seven (7) members appointed by the governor with the advice and consent of the senate. The council holds a minimum of four (4) regular meetings each year and such special meetings and hearings as the council chairman may deem necessary.

(2) The Missouri dam and reservoir safety law and rules, regulations, guidelines and standards provide for the construction management and operation of dams and reservoirs in a manner which will provide adequate protection of public safety, life or property. To achieve this purpose the council has statutory powers as listed in sections 236.405 and 236.415, RSMo (Supp. 1980) for policy making, adopting rules, regulations, standards and guidelines and issuing of permits.

(3) The Department of Natural Resources is authorized under section 236.405, RSMo (Supp. 1980) to administer and enforce all rules, regulations, standards and guidelines adopted by the council, and assist the council in

achieving its statutory duties. The department has designated the dam and reservoir safety program as the agency within the department responsible for administering the dam and reservoir safety law. The director of the Department of Natural Resources appoints a chief engineer, who is the dam and reservoir safety program director, and a staff as provided in section 236.405, RSMo (Supp. 1980). The chief engineer and staff provide day-to-day operation of the dam and reservoir safety program.

(4) Among its operations, the dam and reservoir safety program performs administrative and technical functions including: review permit applications and recommend approval or denial of such applications; inspect dams and reservoirs; enforce the law and all rules, regulations, standards and guidelines adopted pursuant to Chapter 236, RSMo (Supp. 1980); employ necessary staff; develop facts as may be required by the council; recommend rules, regulations, standards and guidelines required by Chapter 236, RSMo (Supp. 1980); mitigate or eliminate unsafe dam or reservoir conditions; and other functions as described in section 236.420 to 236.500, RSMo (Supp. 1980).

(5) Requests for permit applications, requirements or other permit information, copies of these rules and the dam and reservoir safety law, dam inspections, technical information and assistance, requests for public hearings and any other submissions are to be made to the Department of Natural Resources, Dam and Reservoir Safety Program, P.O. Box 250, Rolla, MO.

Auth: chapter 236, RSMo (Supp. 1980). Original rule filed April 14, 1981, effective August 13, 1981.

10 CSR 22-1.020 Definitions

PURPOSE: *The following terms when used in rules, regulations, standards and guidelines adopted by the Dam and Reservoir Safety Council pursuant to the "dam safety law" shall have the meaning respectively ascribed to them by this section.*

Editors note: The secretary of state has determined that the publication of 10 CSR 22-1.020(41) and 10 CSR 22-1.020(42) in their entirety would be unduly cumbersome or expensive. The entire text of the rule has been filed with the secretary of state. The entire text of the rule may be found at the agency headquarters and is available to any interested person at a cost not more than the actual cost of reproduction.

- (1) "Agency engineer" means an experienced engineer, not necessarily registered as a professional engineer in Missouri, who works for an engineering division of a state or federal agency regularly engaged in dam and reservoir design and construction for soil and water conservation or irrigation or relating to wildlife conservation.
- (2) "Agriculture dam" means any dam, the primary use of which is to impound water for use in irrigation, livestock watering, or commercial fish rearing and sale.
- (3) "Alterations", "repairs", or either means such alterations or repairs as affect the safety of a dam or reservoir, or public safety, life or property.
- (4) "Appurtenant works" means the structures or materials incident to or annexed to dams which are built or maintained in connection with such dams and which are used primarily in connection with their proper operation, maintenance or functioning. This includes, without limitation, such structures as spillways, either in the dam or separate therefrom; the reservoir rim; low level outlet works; and water conduits such as tunnels, pipelines or penstocks, either through a dam or its abutments.
- (5) "Area capacity curves" means graphic curves which show the relationship between reservoir surface area and the storage capacity of the reservoir at given elevations.
- (6) "Chief engineer" means the head of the dam and reservoir safety program of the Department of Natural Resources or his representative.
- (7) "Commercial Fish Rearing" reservoir means a reservoir which was designed specifically for fish rearing purposes and whose primary use is to provide water for commercial fish rearing and sale to other parties in a "for profit" venture. This does not include activities such as sport fishing.
- (8) "Construction permit" means a written authorization issued by the council giving the owner the right to construct, alter, enlarge, reduce, repair or remove a dam or reservoir or appurtenances thereto, with such conditions as are necessary to adequately protect the public safety, life, property, the dam or reservoir.
- (9) "Conventional dam" means any dam other than an industrial water retention dam.
- (10) "Council delegate" or "authorized representative" means an individual, usually the chief engineer, authorized by the council to act in its behalf.

(11) "Crest" or "dam crest" means the top surface of the dam.

(12) "Crest elevation" or "dam crest elevation" means the lowest elevation of the crest exclusive of the spillway(s).

(13) "Dam" means any artificial or man-made barrier which does or may impound water, and which impoundment has or may have a surface area of fifteen (15) or more acres of water at the water storage elevation or which is thirty-five feet (35') or more in height measured either from the natural bed of the stream or watercourse or lowest point on the toe of the dam (whichever is lower) up to the crest elevation, together with appurtenant works. Sections 236.400 to 236.500 shall not apply to any dam which is not or will not be in excess of thirty-five feet (35') in height or to any dam or reservoir licensed and operated under the Federal Power Act.

(14) "Dam and Reservoir Safety Council" referred to as the "council" means seven (7) members appointed by the governor for purposes of implementing the dam safety law.

(15) "Dangerous Dam or Reservoir" is a dam or reservoir which is in an advanced state of deterioration such that if deterioration continues, the threat of dam failure and flooding would be imminent and substantial.

(16) "Department" means the Department of Natural Resources.

(17) "Downstream environment zone" means the area downstream from a dam that would be affected by inundation in the event the dam failed when filled to the emergency spillway crest elevation, or to the dam crest elevation, in the absence of an emergency spillway.

(18) "Earthquake Intensity" means Modified Mercalli intensity which is used to describe the degree of shaking a dam will experience.

(19) "Enforcement Order" means a written directive issued by the council or the chief engineer to the owner of a dam for correction of defects in the dam or reservoir which have been determined to make the structure a threat to public safety, life or property. The order will contain specific actions with which the owner must comply to remove the threat the dam or reservoir poses to public safety, life or property.

(20) "Enlargement" means any change in or addition to an existing dam or reservoir, which raises the height of the dam, increases the watershed for the reservoir or raises the water storage elevation of the water impounded by the dam or reservoir.

(21) "Environmental class" means a classification of the downstream environment zone based on the contents of that zone (see 10 CSR 22-2.040(1)). Class I represents the most severe threat to public safety, life or property and class III the least threat.

(22) "Factor of safety" means the resultant of the summation of the forces resisting failure divided by the summation of the driving forces tending to cause failure.

(23) "Freeboard" means the difference in elevation between the dam crest elevation and the water storage elevation in the reservoir.

(24) "Height" or "height of dam" means the difference in the elevation of either the natural bed of the stream or watercourse or the lowest point on the toe of the dam (whichever is lower) and the dam crest elevation.

- (25) "Impoundment solids" means the solid materials that were conveyed to the impoundment in a tailings slurry, and have now settled out of the slurry to form a solid material that does not flow.
- (26) "Industrial building" means a permanent, enclosed structure used by groups of workers usually involved in some type of manufacturing, processing or industrial related process.
- (27) "Industrial water retention dam" means a dam used to retain the solids transported as water borne industrial byproducts and the associated water. This includes, but is not limited to, tailings dams, slime impoundments, and settling ponds.
- (28) "Inundation" means water, two feet (2') or more deep over the general level of the submerged ground affected outside the stream channel.
- (29) "Inspection" means scheduled and unscheduled examinations of a dam and reservoir with the primary objective of making safety observations and recording them in a written description.
- (30) "Irrigation Reservoir" means a reservoir whose primary use is to provide water for the irrigation of agricultural lands for the production of grains, hay, pasture, fruits, vegetables and animal feeds which are for sale or to be used by the owner.
- (31) "Law" means the dam and reservoir safety law, as contained in Chapter 236, RSMo, and all rules, regulations, standards and guidelines adopted thereto.
- (32) "Liquefaction" is a condition where a soil will undergo continued deformation at a constant low residual stress or with low residual resistance, due to the build-up and maintenance of high pore water pressures, which reduce the effective confining pressure to a very low value.
- (33) "Livestock Watering Reservoir" means a reservoir whose primary use is to provide water for livestock which are raised for breeding or marketing purposes.
- (34) "Maintenance" means the proper keeping of all aspects of a dam or reservoir and appurtenances thereto, that pertain to safety, in a state of repair and working order as necessary to comply with the law and any permit issued thereunder, and to protect public safety, life or property.
- (35) "Modification" or "modifications" means changes or revisions to the design, construction, maintenance, operation or repair or the alteration, enlargement, reduction, removal or natural physical changes that may occur to a dam or reservoir that were not included in the approved plans for the construction permit, or such changes or revisions to a dam or reservoir where a registration or safety permit is in effect or required hereunder, if such changes or revisions would endanger public safety, life or property, as a result of creating a potential failure in the dam or reservoir, except that modification or modifications do not mean or include approved anticipated enlargements, outlined by design plans and specifications submitted and approved with the original application for a construction, safety or registration permit for industrial water retention dams and reservoirs.
- (36) "Observable defects" are those defects which would be detectable by an experienced professional engineer making an on-site visual inspection of the dam in accordance with current engineering, geologic and construction practices.

(37) "Owner" or "dam owner" means a person who owns, controls, operates, maintains, manages or proposes to construct a dam or reservoir including: the state and its departments, institutions, agencies, and political subdivisions, but not the United States government; a municipal or quasi-municipal corporation; a district; a public utility; a natural person, firm, partnership, association, corporation, political subdivision or legal entity; the duly authorized agents or leasees, or trustees of any of the foregoing; or receivers or trustees appointed by any court for any of the foregoing.

(38) "Permanent dwelling" means a dwelling occupied at least ninety (90) days a year.

(39) "Permit" means construction, safety or registration permit.

(40) "Permit applicant" or "applicant" means an owner who applies for a construction, safety or registration permit.

(41) "Probable maximum acceleration" means the horizontal acceleration developed at a dam as a result of an earthquake with a probability of occurrence similar to the probable maximum precipitation. The probable maximum acceleration is readily available from a Corps of Engineers Report entitled "Earthquake Potential of the St. Louis District - Ground Motion Supplement" which is on file with the chief engineer of the Dam and Reservoir Safety Program. See Editors Note.

(42) "Probable maximum precipitation" or "PMP" means the precipitation that may be expected from the most severe combination of critical meteorologic conditions that are reasonably possible in an area. The probable maximum precipitation (PMP) is readily available from the National Weather Service in Hydro-meteorological Report 51, "Probable

Maximum Precipitation Estimates, United States East of the 105th Meridian." See Editors Note.

(43) "Public building" means a permanent, enclosed structure used by groups of the general public but not necessarily owned by the public.

(44) "Registration Permit" means a permit issued for a period not to exceed five (5) years by the council to the owner of a dam or reservoir in existence or in the progress of construction on August 13, 1981 or which becomes subject to the law for such dams and reservoirs by a change in factors or circumstances subsequent to that date. Such permits shall only be issued for dams which are in a properly maintained condition or which have made and complied with recommendations for corrections of observed defects of the dam or reservoir and have been examined and approved in accordance with the law.

(45) "Reservoir" means any basin, including the water, which contains or will contain the maximum amount of water impounded by a dam.

(46) "Retaining structure" means a former dam whose reservoir is full of solids and in such a condition that the structure cannot be breached by the storm event a dam of the same size at that location would be required to withstand or would not fail by any other mechanism common to dam failure such as sliding, piping or settlement.

(47) "Retarding structure" means a former dam that has been breached and is currently in a condition to safely pass the storm event a dam of the same size at that location would be required to withstand.

(48) "Safety Permit" means a permit issued to the owner of a dam for a period

of five (5) years, or less if safety considerations so require, by the council indicating that the dam meets the requirements of the law, and containing such conditions as to operations, maintenance and repair as are necessary to adequately protect public safety, life and the dam or reservoir.

(49) "Seepage" means the migration of water through a dam or foundation.

(50) "Significant Modification" means changes, alterations, or modifications to an existing dam or reservoir or changes to the construction documents for a new dam. These include but are not limited to: changes in the location of the dam or reservoir, changes in the storage capacity or drainage area, changes in the capacity of the spillway system, modification of the embankment slopes, changes in the height of the dam or structure or the use of different construction methods or procedures than those submitted with the permit application.

(51) "Spillway" means any passageway, channel or structure, open or closed, or both, designed expressly or primarily to discharge excess water from a reservoir after the water storage elevation has been reached.

(52) "Spillway design flood" or "SDF" means the specified flood discharge that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in an area and for which the dam and reservoir are designed. The "SDF" is derived from the rainfall values given in Table 5.

(53) "Stability" means the properties of a dam or reservoir that cause it, when disturbed from a condition of equilibrium, to develop forces or moments that restore the original condition.

(54) "Starter dam" means a pervious or impervious dam constructed as the first phase in the building of an industrial water retention dam and reservoir.

(55) "Storage" means the volumetric capacity of the reservoir below the water storage elevation or other selected reference on the dam.

(56) "Stream" means any river, creek or channel, having well-defined banks, in which water flows for substantial periods of the year to drain a given area.

(57) "Tailings" means the material generated by a mining/milling operation which is deposited in slurry form in an impoundment for storage and/or disposal.

(58) "Tailings dam" means an existing dam or reservoir used for the impoundment or retention of tailings, or a proposed, existing or newly constructed dam and reservoir for which the anticipated or contemplated use is the impoundment or retention of tailings.

(59) "Toe" or "toe of slope" means the line of the fill (dam embankment) slope where it intersects the natural ground.

(60) "Water" means water, other liquids or tailings.

(61) "Watercourse" means a valley, swale, depression or other low place in the topography occupied by flowing water during conditions of runoff.

(62) "Water storage elevation" means that elevation of water surface at the principal spillway which could be obtained by the dam or reservoir were there no outflow and were the reservoir full of water.

(63) "Watershed" means the area that contributes or may contribute surface water to a reservoir.

Auth: sections 236.405 and 236.415, RSMo (Supp. 1980). Original rule filed April 14, 1981, effective August 13, 1981. Revisions: Filed June 14, 1984, effective January 1, 1985.

10 CSR 22-1.030 Immunity of Officers

PURPOSE: The purpose of this rule is to restate the immunity from damages provided in section 236.475, RSMo (Supp. 1980).

(1) In the absence of willful and wanton misconduct, no action shall be brought against the council, the chief engineer or his agents, or department employees or private individuals employed as consultants by the depart-

ment for the recovery of damages caused by the partial or total failure of any dam or reservoir or through the use or operation of any dam or reservoir upon the ground that such person is liable by virtue of any of the following: the approval of a dam or reservoir or permits therefore; the issuance or enforcement of orders relating to maintenance, operation or repair of a dam or reservoir; control or regulation of a dam or reservoir; measures taken to protect against failure during an emergency; or denial of a permit.

Auth: sections 236.475, RSMo (Supp. 1980). Original rule filed April 14, 1981, effective August 13, 1981. Revisions: Filed June 14, 1984, effective January 1, 1985.

Title 10 — DEPARTMENT OF NATURAL RESOURCES

Division 22 — Dam and Reservoir Safety Council

Chapter 2 — Permits

10 CSR 22-2.010 Who Needs a Permit.

PURPOSE: The purpose of this rule is to identify those persons who need to obtain a permit for their dam and reservoir and to identify those persons who do not need to obtain a permit for their dam and reservoir.

(1) The owner of a proposed new dam thirty-five feet (35') or more in height is required to obtain a construction permit and a safety permit for his dam and reservoir. The owner of an existing dam thirty-five feet (35') or more in height is required to obtain a registration permit within the time set forth in 10 CSR 22-2.020(2).

(2) By definition, the United States government is not considered an owner.

Therefore, no federal dam and reservoir is regulated by section 236.400 to 236.500, RSMo (Supp. 1980), and no permits are required.

(3) Agricultural dams are exempted from all permit requirements as long as the agricultural dam and reservoir continue to be used primarily for agricultural purposes, (see 10 CSR 22-1.020(2)). The owners of agricultural dams and reservoirs over thirty-five feet (35') in height must notify the council of their reliance on this exemption and their basis for application of this exemption to their dams. If an agricultural dam and reservoir is constructed after the effective date of the law, but subsequently becomes subject to the provisions of the law, the owner shall, prior to obtaining a registration permit, provide evidence that the dam meets the construction

permit criteria in effect at the time the dam was constructed.

(4) Dams and reservoirs licensed and operated under the Federal Power Act are exempted from all permit requirements.

(5) Dams and reservoirs that were designed by and the construction monitored by an agency engineer (see 10 CSR 22-1.020(1)) do not need a construction permit but a set of plans shall be filed with the chief engineer prior to the initiation of the construction activity. These dams and reservoirs are required to have a registration or safety permit subsequent to construction.

(6) Industrial water retention dams (see 10 CSR 22-1.020(27)) and reservoirs regulated by another state agency or federal agency are exempted from all permit requirements. For the exemption to apply, the industrial water retention dam and reservoir must be subject to safety inspections by the other state agency or federal agency and standards used must be at least as stringent as those required by the law. In addition, the owner must notify the council that another agency is regulating his dam and reservoir and explain the basis for the exemption to apply.

(7) Retaining and retarding structures that were dams but no longer function as dams are exempted from all permit requirements. This exemption is for dams that are breached and are currently in a condition to safely pass the storm event a dam of the same size at that location would be required to pass and dams whose reservoir is full of impoundment solids and in such condition that the retaining structure cannot be breached by the storm event a dam of the same size at that location would be required to pass or would not fail by any other mechanism common to dam

failures such as by sliding, piping or settlement. The owner must notify the council that these conditions exist and provide any necessary information for the council to determine whether the exemption applies. The council will then make a written finding granting or denying the exemption.

Auth: sections 236.400, 236.405, 236.415, 236.435, 236.440 and 236.465, RSMo (Supp. 1980). Original rule filed April 14, 1981, effective August 13, 1981. Revisions: Filed June 14, 1984, effective January 1, 1985.

10 CSR 22-2.020 Types of Permits

PURPOSE: The purpose of this rule is to describe the three (3) types of permits and their uses that the Dam and Reservoir Safety Council will issue.

(1) There are three (3) types of permits - registration permits, construction permits, and safety permits, and each one is intended to regulate a separate and distinct type of activity. A dam and reservoir will have only one (1) type of permit in effect at any given time although they may have more than one type of permit during their existence.

(2) Registration permits (see 10 CSR 22-1.020(44)) apply to and are required for the continued operation of a dam and reservoir that was in existence on the effective date of this paragraph, August 13, 1981. A registration permit also applies to and is required for structures which become subject to the provisions of the dam and reservoir safety law that were in existence prior to the date that they became subject to the law. Registration permits may be issued for a time period up to five (5) years. The owner of

a dam and reservoir on the effective date of the law shall obtain his first registration permit in accordance with the height of his dam. For dam heights of thirty-five feet (35') to less than fifty feet (50'), fifty feet to seventy feet (50'-70'), and over seventy feet (70+'), the maximum time to obtain the first registration permit is respectively within six (6) years, four (4) years, and two (2) years from the effective date of this section, August 13, 1981.

(3) Construction permits (see 10 CSR 22-1.020(8)) apply to the construction of a new dam and reservoir, or the alteration, enlargement, reduction, repair or removal of a new or existing dam, reservoir or appurtenances. New dams are dams for which construction commences after the effective date of this section, August 13, 1981. For dams which were under construction on August 13, 1981, construction must be completed by August 13, 1987 or the owner will be required to obtain a construction permit. If completed prior to August 13, 1987, the owner will be required to obtain a registration permit as outlined in 10 CSR 22-2.020(2). A construction permit may be issued for any reasonable length time period required to complete construction, and it may contain appropriate restrictions placed on the owner for construction and operation of the dam and reservoir during that period. At the conclusion of construction, a safety or registration permit shall be obtained by the owner.

(4) Safety permits (see 10 CSR 22-1.020(48)) apply to the operation of a dam and reservoir constructed pursuant to a construction permit. The safety permit is not a guarantee of the dam and reservoir's safety and does not alter the owner's liability; it is simply an operating permit. If a dam and reservoir were not subject to the provisions of the law when they were constructed but

subsequently become subject to the provisions of the law, the owner shall obtain a registration permit, not a safety permit. Safety permits may be issued for a time period up to five (5) years, and they may contain appropriate conditions for the operation and safety of the dam and reservoir.

Auth: sections 236.400, 236.405, 236.415, 236.435, 236.440 and 236.465, RSMo (Supp. 1980). Original rules filed April 14, 1981, effective August 13, 1981. Revisions: Filed June 14, 1984, effective January 1, 1985.

10 CSR 22-2.030 Types of Dams and Reservoirs

PURPOSE: The purpose of this rule is to describe the two (2) fundamentally different types of dams and reservoirs that will be required to obtain permits from the Dam and Reservoir Safety Council.

(1) There are two (2) types of dams and reservoirs, conventional dams and reservoirs and industrial water retention dams and reservoirs. The two (2) types of dams and reservoirs are distinguished on the basis of their reservoir contents and the length of the time period during which active dam building occurs.

(2) Conventional dams and reservoirs (see 10 CSR 22-1.020(9)) are dams and reservoirs used for purposes other than tailings, slime, settling or other similar industrial water retention purposes. A conventional dam is constructed in one relatively continuous operation over a short time span (compared to the design life of the reservoir). Filling and use of the reservoir occurs after construction is completed.

(3) Industrial water retention dams and reservoirs (see 10 CSR 22-1.020(27))

are dams and reservoirs used for the purpose of storing solids and the water associated with the particular industrial process such as tailings, slime and other similar industrial materials. An industrial water retention dam may be constructed in phases and steps or continuously, over a long period of time (compared to the design life of the reservoir). Filling and use of the reservoir may occur during most phases of construction. An industrial water retention dam and reservoir in existence or under construction on the effective date of 10 CSR 22-2.020(2), August 13, 1981, shall obtain a registration permit which may include approval to make enlargements. The owner of any such dam and reservoir shall apply for and obtain new construction and/or registration permits for any modifications to that dam and reservoir other than enlargements covered by an existing permit. A construction permit is required, and shall be obtained by the owner, for the initial construction phase of any new industrial water retention dam and reservoir built after the effective date of 10 CSR 22-2.020(3), August 13, 1981. Upon completion of the initial construction phase, the owner shall apply for a safety permit for the operation and enlargement of the new dam and reservoir.

Auth: sections 236.405, 236.415, 236.435, 236.440 and 236.465, RSMo (Supp. 1980). Original rule filed April 14, 1981, effective August 13, 1981. Revisions: Filed June 14, 1984, effective January 1, 1985.

10 CSR 22-2.040 Classes of Downstream Environment

PURPOSE: The purpose of this rule is to describe the three (3) environmental classes for the downstream environmental zone that will be used by the Dam and Reservoir

Safety Council when considering permits.

(1) The downstream environment zone is the area downstream from a dam that would be affected by inundation in the event the dam failed. Inundation is defined as water two feet (2') or more deep over the general level of the submerged ground affected outside the stream channel. Based on the content of the downstream environment zone, three (3) environmental classes are defined. They are: class I, which contains ten (10) or more permanent dwellings or any public building; class II, which contains one (1) to nine (9) permanent dwellings, or one (1) or more campgrounds with permanent water, sewer, and electrical services, or one (1) or more industrial buildings; and class III, which is everything else.

(2) Spillway design standards are based on the environmental class of the downstream environment zone of a dam and reservoir. The standards become more stringent for lower environmental class numbers. If conditions change in the downstream environment zone and it becomes necessary to change the environmental class of the dam and reservoir, the owner must then meet the standards and criteria for the new environmental class of the dam and reservoir. A dam and reservoir may be in only one (1) environmental class at any given time.

(3) Inundation, the downstream environment zone, and the associated environmental class are analyzed assuming the dam fails with the reservoir at the emergency spillway crest elevation or the dam crest elevation in the absence of an emergency spillway. If the spillway standards for class I are used, the failure analysis does not have to be performed. If a failure analysis is made, the contents of the downstream

environment zone used to determine the environmental class are only the features that would be inundated by the flooding resulting from the dam failure.

Auth: sections 236.405, 236.415, 236.435, 236.440 and 236.465, RSMo (Supp. 1980). Original rules filed April 14, 1981, effective August 13, 1981. Revisions: Filed June 14, 1984, effective January 1, 1985.

10 CSR 22-2.050 Issuing First Permit

PURPOSE: The purpose of this rule is to describe the procedure for issuing the first permit to a dam and reservoir owner for a particular dam and reservoir.

(1) A permit will be issued or a letter will be sent to the owner with comments within forty-five (45) days after the receipt of a properly prepared application or after the completion of any hearings or record period conducted by the council in connection with such application, whichever is later. The council, upon hearing the recommendations of the chief engineer, shall approve or deny the permit application.

(2) A permit will be issued if a complete and proper application has been submitted and the dam and reservoir comply with the law.

(A) A registration permit may be denied if it is determined that the owner has not complied with the experienced professional engineer's or agency engineer's inspection recommendations.

(B) A construction permit may be denied if there is insufficient information to determine that the proposed construction, alteration, enlargement, reduction, or removal of a dam or reservoir would not endanger public safety, life or property.

(C) A safety permit may be denied if it is determined that there are violations of the construction permit or the law.

(D) If revisions have been made which vary substantially from the provisions of the construction permit, the owner must show that the revisions do not endanger public safety, life or property before a safety permit will be issued.

(3) Conditions contained in a construction permit shall include that the construction work must be under the responsible charge of an experienced professional engineer and that records be kept and made available as required by the chief engineer including, without limitation, for the foundation excavation and inspection and placement of backfill in the core trench. It is not necessary for the engineer in responsible charge to be on site continuously. During construction, the council or its delegate, the chief engineer, may make periodic site inspections for the purpose of inspecting for and securing conformity of construction with the approved plans and specifications, and the owner shall, upon reasonable notice, permit such person entry upon its property to make such inspections. The owner may be required to perform, at its own expense, reasonable work or tests as are necessary to provide sufficient information to enable the council to determine that there is such conformity. Usually, such testing will be limited to verification of embankment compaction, concrete strengths and other similar requirements. It is expected that such tests will be required where the owner's inspection records are lacking.

(4) Any significant modifications from a construction permit or approved plans makes the permit void and requires the owner to obtain a new permit. Significant modification to the plans and specifications must be prepared by an

experienced professional engineer. The council or its delegate will follow the same evaluation procedures for the modifications as used with issuance of the original construction permit. Special attention will be given to these modification requests to provide a quick decision.

(5) The owner of a dam and reservoir that is removed under a construction permit must notify the council or its delegate when this work is completed and in conformity with the provisions of the construction permit. The council or its delegate will then issue a final approval to relieve the owner of the requirement to have a permit upon a showing that the requirements of the law for removal have been satisfied.

(6) Approval by the council for a construction permit becomes invalid within one (1) year unless work on the construction has begun within that period, except that the owner may be excused from beginning work for such period of time that the work is prevented by flood, shortage of materials or regulation of government which cannot be met for reasons over which the owner has no control or other causes beyond the owner's control. The same applies to construction of approved modifications contained in the conditions of a registration or safety permit for industrial water retention dams unless the conditions specify a different time schedule.

Auth: sections 236.400, 236.405, 236.415, 236.435, 236.440 and 236.465, RSMo (Supp. 1980). Original rule filed April 14, 1981, effective August 13, 1981. Revisions: Filed June 14, 1984, effective January 1, 1985.

10 CSR 22-2.060 Issuing Permit Renewals

PURPOSE: The purpose of this rule is to describe the procedure for renewing a permit.

(1) The owner of a permitted dam and reservoir must apply for the renewal of the permit not less than sixty (60) days prior to expiration of that permit. Before any permit may be renewed, the chief engineer must determine that the dam and reservoir are essentially as described in the latest permit and approved plans; they satisfy the law; and that no inspection conducted in connection with the permit renewal reveals any defect which would threaten public safety, life or property. The council or its delegate will issue another permit within forty-five (45) days of the receipt of a complete and proper application unless it is determined that the dam and reservoir are not as described in the latest permit and approved plans; not properly maintained; do not satisfy the law; or that the defects are not corrected.

(2) The council may require the owner to furnish a certification by an experienced professional engineer or an agency engineer that the dam and reservoir are as described in the latest permit and approved plans; are properly maintained; satisfy the law; and have all the defects corrected.

Auth: sections 236.405, 236.415, 236.440 and 236.465, RSMo (Supp. 1980). Original rule filed April 14, 1981, effective August 13, 1981. Revisions: Filed June 14, 1984, effective January 1, 1985.

10 CSR 22-2.080 Revoking Permit

PURPOSE: The purpose of this rule is to describe the reasons for revoking a permit.

(1) Approval of the council or its delegate, the chief engineer, shall be obtained for modifications that substantially alter or adversely affect the safety or stability of the dam or reservoir. Such modifications, without the

approval of the council or its delegate, the chief engineer, are cause for suspension or revocation of any permit. If the chief engineer finds that the condition of the dam and reservoir has deteriorated substantially from those conditions present when the permit was issued, or that has defects which adversely affect the safety or stability of the dam and reservoir or threatens public safety, life or property, he shall suspend or revoke the permit. If a permit is suspended or revoked, the dam owner will be in violation of the law and may be subject to prosecution for a misdemeanor.

(2) If the chief engineer determines that a dam or reservoir constitutes a threat to public safety, life or property, he may order its removal or take any other actions necessary to reduce or eliminate such threat. Failure of a dam owner to alter or remove his dam and reservoir, as directed, when it is found to be a threat to public safety, life or property will result in revocation of the permit and, if necessary, removal of the dam or any other action necessary to reduce or eliminate the threat to public safety, life or property by the state at the owner's expense.

Auth: sections 236.405, 236.415, 236.445, 236.495 and 236.500, RSMo (Supp. 1980). Original rule filed April 14, 1981, effective August 13, 1981. Revisions: Filed June 14, 1984, effective January 1, 1985.

10 CSR 22-2.090 Transferring Permit

PURPOSE: The purpose of this rule is to describe the procedure for transferring a permit when ownership changes.

(1) Permits issued pursuant to 10 CSR 22-2.050 and 10 CSR 22-2.060 are trans-

ferable only as provided in section 236.460, RSMo (Supp. 1980). If ownership or other transfer of interest in the dam and reservoir changes, the former owner must notify the chief engineer of the sale or transfer and the permit will be transferred to the new owner after determination that such transfer will not endanger the public safety, life, property, the dam or reservoir. The permit holder of record will be held responsible for maintaining compliance with these rules and standards. If the former owner does not have the permit transferred, the new owner may submit the appropriate application and documents necessary to obtain a new permit. The new owner must, in this case, also show proof of ownership. The old owner's responsibilities of ownership under the law will not be extinguished until the permit is transferred to an eligible owner. Nothing in these regulations shall be construed to eliminate the liability of the previous owner for damages or injuries caused by a dam failure, nor a new operator who has not obtained a permit nor had an existing permit transferred to his name.

Auth: sections 236.405, 236.415 and 236.460, RSMo (Supp. 1980). Original rule filed April 14, 1981, effective August 13, 1981. Revisions: Filed June 14, 1984, effective January 1, 1985.

10 CSR 22-2.100 Appeal of Action on Permits

PURPOSE: The purpose of this rule is to describe the procedure for appealing the results of any action taken with regard to a permit.

(1) Permits revoked or denied are subject to council appeal. All parties shall be afforded an opportunity for hearing before the council for review of denial

or revocations decisions, if request is made within thirty (30) days after notice is served personally or by certified or registered mail upon such parties or their agents. Except for emergency action, further legal action shall not be taken until after such hearing and council decision.

(2) The record of hearing shall include all written testimony, data, records, etc., as well as all oral proceedings recorded stenographically or by such other means that will preserve the testimony. Rules of discovery, evidence and privilege as applied in civil cases in the circuit courts shall be followed.

(3) A final decision will be in writing, and the party or their agents will be notified personally or by registered or certified mail of the final decision. A copy of any opinion in support of this decision will be furnished upon request. Such decisions are subject to judicial review pursuant to provisions of section 236.480, RSMo (Supp. 1980).

Auth: sections 236.405, 236.415, 236.425, 236.440, 236.445, 236.470 and 236.480, RSMo (Supp. 1980). Original rule filed April 14, 1981, effective August 13, 1981. Revisions: Filed June 14, 1984, effective January 1, 1985.

Title 10 — DEPARTMENT OF NATURAL RESOURCES

Division 22 — Dam and Reservoir Safety Council

Chapter 3 — Permit Requirements

10 CSR 22-3.010 General Information

PURPOSE: The purpose of this rule is to provide general information about permit requirements.

(1) Requirements for existing or proposed dams and reservoirs must allow for variations in conditions and materials from site to site. Therefore, this rule and rules 10 CSR 22-3.020 to 10 CSR 22-3.050 describe the minimum general requirements which are consistent with current engineering, geologic, construction, operation and maintenance practices, necessary to obtain permits from the Dam and Reservoir Safety Council.

(2) These rules are not intended to define the only requirements for a dam and reservoir to comply with the law, or the only engineering, geologic and construction practices to be used in detailed

site investigation or in the specific design and construction of individual dams. The detailed and specific information that outlines current and prudent engineering, geologic and construction practices is available in technical literature. Determinations by the Dam and Reservoir Safety Council, after hearing the recommendations of the chief engineer of the acceptability of a design and adequacy of plans, specifications and construction must, by necessity, be made on a case by case basis. Therefore, it is recommended that applicants unfamiliar with the way these rules are applied contact the council or the chief engineer prior to commencing extensive work or plan development.

(3) Adherence to the law does not guarantee the safety of any dam or reservoir or relieve the owner of any liability in the event of dam failure.

(4) A permit application form along with a copy of the laws, rules, standards and guidelines relating to dam and reservoir safety can be obtained free from the Department of Natural Resources, Division of Geology and Land Survey, Dam Safety Program, P.O. Box 250, Rolla, MO 65401. Persons seeking this and/or other information on dams in Missouri should address their inquiry to the chief engineer.

Auth: sections 236.400, 236.405, 236.415, 236.435, 236.440 and 236.465, RSMo (Supp. 1980). Original rule filed April 14, 1981, effective August 13, 1981. Revisions: Filed June 14, 1984, effective January 1, 1985.

10 CSR 22-3.020 General Requirements

PURPOSE: The purpose of this rule is to itemize the basic requirements and standards that apply to all permits.

(1) The permit application must contain information required by the council and the chief engineer including, but not limited to, the following information: type of permit being applied for; name of owners; mailing address of owners; telephone number(s) of owners; name of dam; name of reservoir; coordinate location of the dam centerline at the maximum section; purpose or use of dam and reservoir; name, address and telephone number of the experienced professional engineer or agency engineer who has provided or will provide required technical assistance; and the downstream environment zone environmental class for the dam and reservoir. The owners must complete all applicable investigations required in 10 CSR 22-3.020 to 10 CSR 22-3.050 before filing a permit application. All permit applications must be filed with the chief

engineer at the address listed in 10 CSR 22-3.010(4).

(2) The owner must provide a determination of an environmental class for each dam and reservoir. The method, data and assumptions used by the owner to determine environmental class shall conform to practices reputable and in current use in the engineering, geologic and construction professions or the chief engineer may reject the owner's classification. If an owner chooses not to have this done by an experienced professional engineer or an agency engineer, the chief engineer will assign the dam and reservoir to environmental class I or he may assign the dam and reservoir to the appropriate environmental class if he has justification to do so.

(3) The anticipated consequences of a dam failure with respect to public safety, life and property damage are important considerations in establishing acceptable methods for specific investigations and sites. Methods used in exploration, design, construction and maintenance must be in accordance with good engineering practices reputable and in current use in the engineering, geologic and construction professions.

(4) When the owner is applying for a construction permit, the required design factors of safety for slope stability for earth and rock conventional dams which are given in Table 1 shall be met. The required design factors of safety for concrete conventional dams are given in Table 2. The required design factors of safety for slope stability for industrial water retention dams are given in Table 3. Owners shall meet these requirements in the design of new dams prior to the issuance of the permit. Owners shall also meet these requirements when substantial changes are proposed to the height or slope of an existing conventional dam or structure prior to the

TABLE 1
Required Design Factors of Safety for Slope Stability
Earth and Rock Conventional Dams

Loading Condition	Factor of Safety
End of construction, full reservoir*	1.4
Steady seepage, full reservoir*	1.5
Steady seepage, maximum reservoir**	1.3
Sudden drawdown, from full to empty reservoir (if applicable)	1.2
Earthquake***, steady seepage, full reservoir*	1.0

* Full reservoir means water level is at the water storage elevation.
** Maximum reservoir means water level is at maximum water level attained during the spillway design flood or at the dam crest elevation, whichever is lower.
*** Earthquake loading will vary according to dam location in relation to seismic source zones and downstream environmental zones. See Table 4.

TABLE 2
Required Design Factors of Safety
Concrete Conventional Dams

Failure Mode	Loading Condition	Factor of Safety
Overturning	full reservoir*	1.5
	maximum reservoir**	1.3
Sliding	full reservoir*	1.5
	maximum reservoir**	1.3
Structural integrity	full reservoir*	1.5
	maximum reservoir**	1.3
Earthquake*** — any mode	full or maximum reservoir* & **	1.0

* Full reservoir means water level is at the water storage elevation.
** Maximum reservoir means water level is at maximum level attained during the spillway design flood.
*** Earthquake loading will vary according to dam location in relation to seismic source zones and downstream environmental zones. See Table 4.

issuance of the construction permit.
(see following tables)

(5) For new dams constructed wholly or partially of cohesionless materials (such as sands and silts) or having a foundation of cohesionless materials, earthquake loading may result in the build-up of pore water pressures and a

loss of strength. Engineers shall take this pore pressure increase and loss of strength into account when performing their stability analysis, but the degree to which liquefaction may affect the factor of safety for slope stability shall be left up to the engineer's best judgement. Bedrock accelerations and earthquake intensities are listed in Table 4.

TABLE 3
Required Design Factors of Safety for Slope Stability
Industrial Water Retention Dams

Loading Condition	Factor of Safety
Starter dam, end of construction, full reservoir*	1.4
Any other stage of construction, full reservoir*, steady seepage	1.3
Any other stage of construction, maximum reservoir**, steady seepage	1.0
Completed dam, full reservoir*, steady seepage	1.5
Completed dam, maximum reservoir**, steady seepage	1.3
Earthquake***, steady seepage, full reservoir	1.0

* Full reservoir means water level is at the water storage elevation.

** Maximum reservoir means water level is at the maximum level attained during the spillway design flood or at the dam crest elevation, whichever is lower.

*** Earthquake loading will vary according to dam location in relation to seismic source zones and downstream environmental zones. See Table 4.

TABLE 4
Required Design Acceleration For
Earthquake Design

Dam Type	Stage of Construction	Special Descriptions	Environmental Class			
			I	II	III	
Conventional or Industrial	Completed	Two or more dams in a series	.75PMA*	.5PMA*	.5PMA*	
		Storage x height greater than 30,000**	.75PMA*	.5PMA*	.4PMA*	
		Storage x height less than 30,000**	.75PMA*	.5PMA*	.3PMA*	
Industrial	Starter dam	Any	.5PMA*	.2PMA*	.1PMA*	
	After starter dam is finished and before final dam is completed	Any	.75PMA*	.5PMA*	.2PMA*	
Zone:	A	B	C	D	E	F
PMA*:	0.31g	0.28g	0.26g	0.23g	0.20g	0.17g
Intensity***:	IX-X	IX	VIII-IX	VIII	VII-VIII	VII

* PMA is Probable Maximum Acceleration of bedrock which is determined as a fraction of the acceleration of gravity ($g = 32.2 \text{ fps}^2$) for six zones in Missouri. (See 10 CSR 22-1.020(41)).

** Storage in acre-feet measured at emergency spillway crest elevation and height in feet.

*** Modified Mercalli Intensity.

TABLE 4 (cont.)

ZONE A	ZONE C (cont.)	ZONE E (cont.)	ZONE E (cont.)	ZONE E (cont.)
Dunklin Mississippi New Madrid Pemiscot	St. Francois Ste. Genevieve Shannon	Barton Bates Benton Boone Caldwell Callaway Camden Carroll Cass Cedar Chariton Christian Clark Cole Cooper Dade Dallas Gasconade Greene Henry Hickory Howard Jackson Jasper Johnson Knox Laclede	Lafayette Lawrence Lewis Lincoln Linn Livingston McDonald Macon Maries Marion Miller Moniteau Monroe Montgomery Morgan Newton Osage Pettis Pike Polk Ralls Randolph Ray St. Charles St. Clair Saline Scotland	Shelby Stone Vernon Warren Webster
ZONE B	ZONE D			ZONE F
Bollinger Butler Cape Girardeau Ripley Scott Stoddard Wayne	Crawford Dent Douglas Franklin Jefferson Ozark Phelps Pulaski St. Louis St. Louis City Taney Texas Washington Wright			Adair Andrew Atchison Buchanan Clay Clinton Davies DeKalb Gentry Grundy Harrison Holt Mercer Nodaway Platte Putnam Schuyler Sullivan Worth
ZONE C	ZONE E			
Carter Howell Iron Madison Oregon Perry Reynolds	Audrain Barry			

TABLE 5
Required Spillway Design Flood
Precipitation Values

Dam Type	Stage of Construction	Special Descriptions	Environmental Class		
			I	II	III
Conventional or Industrial	Completed	Two or more dams in a series	.75PMP*	.5PMP*	.5PMP*
		Storage x height greater than 30,000**	.75PMP*	.5PMP*	.4PMP*
		Storage x height less than 30,000**	.75PMP*	.5PMP*	.3PMP*
Industrial	Starter dam	Any	.5PMP*	.2PMP*	.1PMP*
	After starter dam is finished and before final dam is completed	Any	.75PMP*	.5PMP*	.2PMP*

* PMP is probable maximum precipitation.

** Storage in acre-feet measured at emergency spillway crest elevation and height in feet.

(6) New dams constructed wholly of cohesive materials (such as clays) and having a foundation of cohesive materials or bedrock, can be expected to withstand significant earthquake shaking if it can be shown that other required design factors of safety for slope stability are met. Therefore, only new dams located in Bollinger, Butler, Cape Girardeau, Dunklin, Mississippi, New Madrid, Pemiscot, Ripley, Scott, Stoddard and Wayne Counties must meet the requirements for slope stability during earthquake loading while dams located in other counties do not unless 10 CSR 22-3.020(5) applies to them. Bedrock accelerations and earthquake intensities are listed in Table 4.

(7) The required spillway design flood, which shall allow for flood storage in the reservoir, is to be derived by using the precipitation values given in Table 5 and shall apply to both new and existing dams.

Auth: sections 236.400, 236.405, 236.415, 236.435, 236.440 and 236.465, RSMo (Supp. 1980). Original rule filed April 14, 1981, effective August 13, 1981. Revisions: Filed June 14, 1984, effective January 1, 1985.

10 CSR 22-3.030 Registration Permit Requirements

PURPOSE: The purpose of this rule is to itemize the requirements for a registration permit.

(1) In addition to the basic requirements for all permits listed in 10 CSR 22-3.020(1),(2),(3) and (7), the registration permit application for a conventional dam and reservoir must include certification by an experienced professional engineer or an agency engineer that the dam and reservoir have been inspected in accordance with the law and

that the owner has complied with the engineer's recommendations to correct observed defects and an inspection report, as required by the law. The engineer must further show that the spillway can safely pass the spillway design flood derived from Table 5 and submit a report describing the correction of all observed defects and the description of an operation and maintenance program to be followed while the registration permit is in effect.

(A) The inspection of a dam and reservoir for a registration permit is intended to detect observable defects. The procedure to determine observable defects normally will be a surface examination by an experienced professional engineer or an agency engineer. The inspection must include all surface examinations necessary to determine if observable defects exist that affect the stability of the dam and reservoir or the adequacy of the spillway. Judgement of the structural stability and an evaluation of the spillway capacity must be made. Judgement shall be based upon the engineer's experience, training and knowledge of similar dams and in accordance with practices reputable and in current use in the engineering, geologic and construction professions.

1. Observed defects which may require correction, evaluated on the basis of current engineering, geologic and construction practices, include but are not limited to: slides; slopes as steep as or steeper than those on similar types of dams and constructed of similar materials which have experienced slope stability problems; piping of fines; seepage that exits in an uncontrolled fashion on the downstream slope of or from the downstream foundation of the dam; unusual zones of softness and irregular settlement; erosion on the upstream or downstream slope of the dam; spillways that are calculated to be inadequate for the design flood; spill-

ways that are eroded or otherwise in poor condition, and cracks in the embankment or structure.

2. Observed defects that are in an advanced state of deterioration must be immediately reported by the inspecting engineer to the owner and to the chief engineer.

(B) Proper maintenance and operation of a dam and reservoir are critical to the continuing safety of a dam and reservoir and to public safety, life and property. A maintenance program shall be required and shall include the following items: erosion control on the embankment; monitoring emergency spillway flow rates; vegetation control; spillway maintenance; emergency action plans; maintenance and monitoring of seepage observation devices, if any; and maintenance and monitoring of instruments used, if any, to observe the stability of the dam.

(C) Visits for the purpose of observation of maintenance and operation may be made by the council, the chief engineer or a member of the chief engineer's staff. Such visits will be at any reasonable time following reasonable notice, except that in the case of an emergency threatening public safety, life or property no such notice shall be required, and inspection may be at any time. Owners shall permit entry to its property for such persons to perform such inspections.

(D) The application need not state, nor is it necessary to show, that the dam is a safe dam. The intent of the registration permit is to show that the dam is performing adequately and that there are no observable indications that the dam is unsafe.

(2) In addition to the basic requirements for all permits listed in 10 CSR 22-3.020(1),(2),(3) and (7), the registration permit application for an industrial water retention dam and reservoir shall

include certification by an experienced professional engineer or an agency engineer that the dam and reservoir have been inspected in accordance with the law and that the owner has complied with the engineer's recommendations to correct observed defects and an inspection report, as required by the law. The engineer must further show that the spillway can safely pass the spillway design flood derived from Table 5 and submit a report describing the correction of any observed defects, the operation and maintenance program to be made a part of the registration permit, and the phased, stepped and/or continuous construction of the dam.

(A) The inspection of an industrial water retention dam and reservoir for a registration permit is intended to detect observable defects. The procedure to determine observable defects normally will be a surface examination by an experienced professional engineer or an agency engineer. The inspection must include all surface examinations necessary to determine if observable defects exist that affect the stability of the dam and reservoir or the adequacy of the spillway. Judgement of the structural stability and an evaluation of the spillway capacity must be made. Judgement shall be based upon the engineer's experience, training, and knowledge of similar dams and in accordance with practices reputable and in current use in the engineering, geologic and construction professions.

1. Observed defects which may require correction, evaluated on the basis of current engineering, geologic and construction practices, include but are not limited to: slides; slopes as steep as or steeper than those on similar types of dams and constructed of similar materials which have experienced slope stability problems; piping of fines; seepage that exits in an uncontrolled fashion on the downstream slope of or

from the downstream foundation of the dam; unusual zones of softness and irregular settlement; erosion on upstream or downstream slope of dam; spillways that are calculated to be inadequate for the design flood; spillways that are eroded or otherwise in poor condition and cracks in the embankment or structure.

2. Observed defects that are in an advanced state of deterioration must be immediately reported by the inspecting engineer to the owner and to the chief engineer.

(B) Proper maintenance and operation of a dam and reservoir are critical to the continuing safety of a dam and reservoir and the protection of public safety, life and property. A maintenance and operation program shall be required and shall include the following items: erosion control on the embankment; monitoring of storm runoff; vegetation control; spillway maintenance; emergency action plans; maintenance and monitoring of seepage observation devices, if any; and maintenance and monitoring of instruments used, if any, to observe the stability of the dam.

(C) The council or chief engineer may require the owner to submit a report describing the phased, stepped and/or continuous construction of an industrial water retention dam and reservoir, containing information on the materials used, method of transport and placement of materials, the sequence and placement location of materials, spillway changes to be made, the anticipated final dimensions and configuration of the dam and the name, address and telephone number of the person(s) in responsible charge of this work.

(D) Visits for the purpose of inspecting during construction or enlargement or observation of maintenance and operation may be made by the council, the chief engineer or a member of the

chief engineer's staff. Such visits will be at any reasonable time following reasonable notice, except that in the case of an emergency threatening public safety, life or property, no such notice shall be required, and inspection may be made at any time. Owners shall permit entry to its property for such persons to perform such inspection.

(E) It shall not be necessary for the owner to retain an experienced professional engineer or an agency engineer continuously during the entire permit period unless there is modification(s) in the construction method described in the permit application. However, personnel with adequate supervision and training in methods of safe construction, maintenance, and operation of dams must be provided to insure that the construction, maintenance, and operation of the dam and reservoir are carried out as described.

(F) The registration permit will be the only permit required for an industrial water retention dam and reservoir that was in existence prior to the effective date listed in 10 CSR 22-2.020(2) unless it is to be reduced and removed. If the dam or reservoir is to be reduced or removed, a construction permit will be required. Other changes will require the owner to obtain a new registration permit.

(G) The application need not state, nor is it necessary to show, that the dam is a safe dam. The intent of the registration permit is to show that the dam is performing adequately and that there are no readily observable indications that the dam is unsafe, and that phased, stepped and/or continuous construction of the dam will meet the requirements of the law.

Auth: sections 236.400, 236.405, 236.415, 236.420, 236.425, 236.440 and 236.465, RSMo (Supp. 1980). Original rule filed April 14, 1981, effective August 13, 1981.

*Revisions: Filed June 14, 1984,
effective January 1, 1985.*

10 CSR 22-3.040 Construction Permit Requirements

*PURPOSE: The purpose of this rule
is to itemize the requirements for
a construction permit.*

(1) In addition to the basic requirements for all permits listed in 10 CSR 22-3.020, the construction permit application for a conventional dam and reservoir shall be prepared by or under the direction of and certified by an experienced professional engineer and shall be in accordance with practices reputable and appropriate in the engineering, geologic and construction professions.

(A) The following requirements shall apply to, and the following information shall be provided by the owner:

1. Up-to-date topographic map(s) showing the location of the proposed or existing dam, the upstream watershed, the reservoir, and the downstream environment zone. The topographic map(s) of the project area must be at a scale appropriate to the size of the project area. An up-to-date U.S. Geological Survey topographic map is considered a minimum;

2. Exploration records and results including the location of all exploration, especially in the area of the core trench, the method(s) used to explore the site, a record of what was found, the method(s) used to obtain samples and the number of samples taken;

3. Testing records and results including information on the care and treatment of samples, types of tests performed on samples or in situ, reference(s) to or the procedures used in testing, and the test results. Physical and mechanical properties of foundation and construction materials must include the information source for these values

especially if they are not the results of testing;

4. The geotechnical design procedure(s) or method(s) shall be identified and referenced or described so that they may be reviewed and their applicability verified. This shall include all assumptions made. The geotechnical procedure(s) or design results shall include the minimum computed factors of safety and they must meet or exceed the required design factors of safety (see 10 CSR 22-3.020(4)). The geotechnical design information shall be presented for the foundation, core trench, and dam embankment. Earthquake loading must be analyzed as outlined in 10 CSR 22-3.020(5) and (6);

5. The structural design procedure(s) or method(s) shall be identified and referenced or described so that they may be reviewed and their applicability verified. Design results for concrete dams and concrete structures appurtenant to embankment dams shall provide for and show an adequate factor of safety for normal and maximum loading conditions of compression, tension, shear, torsion, buckling, sliding, and overturning;

6. Hydrologic information used to evaluate the watershed, reservoir, spillway and downstream environment zone including the watershed area, rainfall rate and duration, antecedent moisture conditions, time of concentration, area capacity curves, description of spillway elevation(s), type(s), dimensions, locations, cross-sections and profiles, dam crest elevation and the downstream valley cross-sections;

7. The hydrologic/hydraulic design procedure(s) or method(s) used shall be identified and referenced or described so that they may be reviewed and their applicability verified. This shall include all assumptions made. The hydrologic/hydraulic procedure(s) or design results shall include the reservoir inflow

hydrograph, the reservoir outflow hydrograph, the spillway discharge capacity, the freeboard at the maximum water storage elevation and the environmental class of the dam. The dam shall be capable of safely containing or discharging the required design flood (see 10 CSR 22-3.020(7));

8. Location and design of diversion channels or other structures to control stream flow during or after construction shall be provided if failure of these channels or other structures would affect hydrologic conditions of the dam. Stream diversion systems used during construction shall be designed to provide protection to the dam and the safety of the public;

9. Construction control and inspection procedures shall be used during the construction of a new dam and reservoir or modification of an existing dam and reservoir. Construction control and inspection procedures should include compaction testing and density testing;

10. Procedures shall be used for record keeping and monitoring throughout the construction or modification process to provide information about any construction progress and conditions that may cause difficulties during construction;

11. The location of and protective measures used in conjunction with all drain lines, sewer lines, utilities or other

structures that pass through or under the dam;

12. Topographic surveys showing the location of baselines, centerlines and other horizontal and vertical control points sufficiently accurate to locate the proposed construction and to define the volume of storage in the reservoir;

13. Two (2) sets of plans and specifications including:

A. Graphic scales shall be provided for all scaled drawings,

B. The title, which shall be identical on the plans and the specifications, shall include: the name of the dam; the name of the owner; whether the work shows an existing dam, a proposed dam or an enlargement, repair or alteration of the dam or reservoir; the county or counties the dam and reservoir are in; the location of the dam by quarter section, section, township, and range or by geodetic coordinates; and each sheet shall have in an appropriate title block the name of the dam as well as the sheet number in relation to the total, e.g. sheet 1 of 12, and

C. Certifications by the experienced professional engineer and the owner shall be placed near the lower right hand corner of the title sheet (first sheet) of the drawings. The certifications shall be similar to those presented in figures 1 and 2 (see figures 1 and 2); and

FIGURE 1

Certification by Experienced Professional Engineer

I hereby certify that these plans for the (insert the correct word or words choosing from: existing; construction of the; repair of the; enlargement of the; or alteration of the) _____

Name of Dam

_____ Dam were prepared by me (or under my direct supervision) for the owners thereof.

Firm Name

Registered Engineer

FIGURE 2

Certification by Owner

I, _____, owner, whose Post Office Address
Name of Owner
is _____, Zip _____, do
Owner's Address
hereby accept and approve these plans.

Owner

14. If a construction permit is requested to convert a dam to a retaining or retarding structure, the procedure to be followed in making the conversion shall be described by the owner.

15. The procedures set up for regular inspection by the owner. The owner shall develop an emergency action plan, inspect his dam regularly and as necessary to protect public safety, life and property. A list of items to be inspected, a time schedule for these inspections and a form for reporting the results shall be established.

(B) The council or chief engineer may require the following action and information from the owner:

1. Procedures set up to provide regular maintenance and minor repairs to the dam and reservoir after construction and to continue or start record keeping and monitoring work so that the dam and reservoir are maintained in a safe condition and a complete history of its performance is available;

2. Location and types of instrumentation, drainage and/or seepage control facilities. Monitoring equipment and drainage and seepage control facilities are recommended for all dams and reservoirs; however, depending on conditions, they may be mandatory items if necessary to accomplish the purposes of the law;

3. The downstream environment zone warning procedure to be used if dam failure is a threat. A downstream

environment zone warning system is recommended for all dams and reservoirs; however, depending on conditions, it may be necessary to accomplish the purposes of the law. This would consist of the current name(s) of the dam and reservoir owners representative(s) responsible for giving notification of a threat of failure and the current phone numbers of appropriate local police and other persons having emergency assistance authority;

4. Upstream slope protection from wave action; and

5. Additional actions or information as required to protect public safety, life, and property and to accomplish the purposes of the law.

(C) Visits for the purpose of inspecting during or after construction or observation of operation and maintenance may be made by the council, the chief engineer or a member of the chief engineer's staff. Such visits will be at any reasonable time following reasonable notice, except that in the case of an emergency threatening public safety, life or property, no such notice shall be required and inspection may be made at any time. Owners shall permit entry to their property for such persons to perform such inspections.

(2) In addition to the basic requirements for all permits listed in 10 CSR 22-3.020, the construction permit application for an industrial water retention

dam and reservoir shall be prepared by or under the direction of and certified by an experienced professional engineer and shall be in accordance with practices reputable and appropriate in the engineering, geologic and construction professions.

(A) The engineer who plans and designs an industrial water retention dam and reservoir or its modification shall assess the sequence, timing, method of placement and stability control program during construction from the beginning of the starter dam or modification through the life of the structure and after operation ceases or until the dam and reservoir no longer need a permit.

(B) Adequate records, as required by good practices in the geologic and engineering professions, shall be kept and made available to the council or chief engineer for the construction, maintenance, and operation procedures. Adequate instrumentation and monitoring of seepage water shall be provided where necessary. Any significant settling or movement in the foundation of the dam should be measured if possible. Trained personnel and adequate supervision shall be provided to insure the construction and operation of the dam and reservoir are carried out to specifications.

(C) The following requirements shall apply to, and the following information shall be provided by the owner:

1. A description of the system used to deposit tailings on the dam;

2. Up-to-date topographic map(s) showing the location of the proposed dam, the upstream watershed, the reservoir and the downstream environment zone. The topographic map(s) of the project area must be at a scale appropriate to the size of the project area. An up-to-date U.S. Geological Survey topographic map is considered a minimum;

3. The location(s) of surface and underground mine workings if these

workings would cause, would contribute to the cause, or would be affected in the event of, failure;

4. Exploration records and results including the location of all exploration, especially in the area of the core trench, the method(s) used to explore the site, a record of what was found, the method(s) used to obtain samples and the number of samples taken;

5. Testing records and results including information on the care and treatment of samples, types of tests performed on samples or in situ, reference(s) to or the procedures used in testing, and the test results. Physical and mechanical properties of foundation and construction materials must include the information source for these values especially if they are not the results of testing;

6. The geotechnical design procedure(s) or method(s) shall be identified and referenced or described so that they may be reviewed and their applicability verified. This shall include all assumptions made. The geotechnical procedure(s) or design results shall include the minimum computer factors of safety and they must meet or exceed the required design factors of safety (see 10 CSR 22-3.020(4)). The geotechnical design information shall be presented for the foundation, core trench and dam embankment. Earthquake loading must be analyzed as outlined in 10 CSR 22-3.020(5) and (6);

7. Type and physical properties of the liquid and solid materials to be used in construction of the dam and contained in the reservoir;

8. The changes created in the downstream environment zone as the dam and reservoir become incrementally larger;

9. The embankment changes and new factors of safety for stability as the dam and reservoir become incrementally larger;

10. If a starter dam is used, whether it will be pervious or impervious;

11. The expected crest elevation, dam configuration, spillway elevation, and the size and configuration of each successive stage of the dam shall be included;

12. Anticipated storage volume of solid or semi-solid materials and of liquids at the completion of the dam;

13. The structural design procedure(s) or method(s) shall be identified and referenced or described so that they may be reviewed and their applicability verified. Design results for concrete dams and concrete structures appurtenant to embankment dams shall provide for and show an adequate factor of safety for normal and maximum loading conditions of compression, tension, shear, torsion, buckling, sliding and overturning;

14. Hydrologic information used to evaluate the watershed, reservoir, spillway and downstream environment zone including the watershed area, rainfall rate and duration, antecedent moisture conditions, time of concentration, area capacity curves, description of spillway elevation(s), type(s), dimensions, location, cross-sections and profiles, dam crest elevation and the downstream valley cross-sections;

15. Hydrologic/hydraulic design procedure(s) or method(s) used shall be identified and referenced or described so that they may be reviewed and their applicability verified. This shall include all assumptions made. The hydrologic/hydraulic procedure(s) or design results shall include the reservoir inflow hydrograph, the reservoir outflow hydrograph, the spillway discharge capacity, the freeboard at the maximum water storage elevation and the environmental class of the dam. The dam shall be capable of safely containing or discharging the required design flood (see 10 CSR 22-3.020(7));

16. The hydrologic changes, the spillway alterations proposed and the

freeboard changes as the dam becomes incrementally larger;

17. Location and design of diversion channels or other structures to control stream flow during or after construction shall be provided if failure of these channels or other structures would affect the stability or hydrologic conditions of the dam. Stream diversion systems used during construction shall be designed to provide protection to the dam and to protect public safety, life, and property.

18. Location and design of any diversion channels or other structures to control runoff or reclaimed water;

19. Construction control and inspection procedures shall be determined by the engineer and used during the construction of a new dam and reservoir or modification of an existing dam and reservoir. Construction control and inspection procedures shall include compaction testing, density testing, and any other quality control measures used to insure compliance with the construction specifications;

20. Procedures shall be used for record keeping and monitoring throughout the construction, enlargement or modification process to provide information about construction progress and any conditions that may cause difficulties during construction;

21. The location of and protective measures used in conjunction with all drain lines, sewer lines, utilities or other structures that pass through or under the dam;

22. Topographic surveys showing the location of baselines, centerlines and other horizontal and vertical control points sufficiently accurate to locate the proposed construction and to define the volume of storage in the reservoir at each planned stage of construction;

23. Two (2) sets of plans and specifications including:

A. Graphic scales shall be provided for all scaled drawings;

B. The title, which shall be identical on the plans and specifications shall include: the name of the owner; whether the work shows an existing dam, a proposed dam or an enlargement, repair or alteration of the dam and reservoir; the county or counties the dam and reservoir are in; the location of the dam by quarter section, section, township and range or by geodetic coordinates; and each sheet shall have in an appropriate title block the name of the dam as well as the sheet number in relation to the total, e.g., sheet 1 of 12;

C. Certification by the experienced professional engineer and the owner shall be placed near the lower right hand corner of the title sheet (first sheet) of the drawings. The certifications shall be similar to those presented in figures 1 and 2 (see figures 1 and 2 preceeding); and

24. If a construction permit is requested to convert a dam to a retaining or retarding structure, the procedure to be followed in making the conversion shall be described by the owner;

25. The procedure set up for regular inspection by the owner. The owner shall develop an emergency action plan, inspect his dam and reservoir regularly and as necessary to protect public safety, life and property. A list of items to be inspected, a time schedule for these inspections and a form for reporting the results shall be established by the council or chief engineer. Items that shall receive maintenance to and/or inspections on a daily basis during periods of active dam enlargement include: the spigots or cyclones; the decant lines; the position of the water pool in relation to the spillway, decant intake, and crest of the tailings dam; drain lines checked for quantity of water and sediment; the embankment observed for visual defects such as slides or significant seepage changes; the spillway

shall be checked to verify that it has not become blocked;

(D) The council or chief engineer may require the following action and information from the owner:

1. Procedures set up to provide regular maintenance and minor repairs to the dam and reservoir during construction and enlargement so that the dam and reservoir are maintained in a safe condition and a complete history of its performance is available;

2. Location and types of instrumentation, drainage and/or seepage control facilities. Monitoring equipment and drainage and seepage control facilities are recommended for all dams and reservoirs; however, depending on conditions, they may be mandatory items if necessary to accomplish the purposes of the law;

3. The downstream environment zone warning procedure to be used if dam failure is a threat. A downstream environment zone warning system is recommended for all dams and reservoirs; however, depending on conditions, it may be necessary to accomplish the purposes of the law. This would consist of the current name(s) of the dam and reservoir owners representative(s) responsible for giving notification of a threat of failure and the current phone numbers of appropriate local police and other persons having emergency assistance authority;

4. Upstream slope protection from wave action; and

5. Additional actions or information as required to protect public safety, life and property and to accomplish the purposes of the law.

(E) Visits for the purpose of inspecting during or after construction or observation of operation and maintenance may be made by the council, the chief engineer or a member of the chief engineer's staff. Such visits will be at any reasonable time following reasonable notice, except that in the case of an

emergency threatening public safety, life or property, no such notice shall be required and inspection may be made at any time. Owners shall permit entry to their property for such persons to perform such inspections.

(F) Drawings to show changes shall be submitted when such changes are made to the original plans including, without limitation, changes in incremental dam crest heights, spillway locations, and cross-sections.

Auth: sections 236.400, 236.405, 236.415, 236.420, 236.425, 236.435, 236.440 and 236.465, RSMo (Supp. 1980). Original rule filed April 14, 1981, effective August 13, 1981. Revisions: Filed June 14, 1984, effective January 1, 1985.

10 CSR 22-3.050 Safety Permit Requirements

PURPOSE: The purpose of this rule is to itemize the requirements for a safety permit.

(1) In addition to the basic requirements for all permits listed in 10 CSR 22-3.020, the safety permit application for a conventional dam and reservoir shall include:

(A) Notification of the completion of construction and application for the first safety permit for the dam and reservoir shall be provided by the owner. The experienced professional engineer or agency engineer who was in responsible charge of the construction work shall certify that the construction was substantially in accordance with the approved plans and specifications. If revisions have been made which vary considerably from the provisions of the construction permit, it must be shown that the revisions do not endanger public safety, life or property. This subsection shall not be construed to excuse any person from the requirement to notify

the council or chief engineer of modifications or revisions prior to commencing such actions and to obtain the required permits or authorization therefore;

(B) Notification of completion shall be within two (2) month's time after completion of construction; and

(C) As built drawings shall be submitted.

(2) In addition to the basic requirements for all permits listed in 10 CSR 22-3.020, the application for a safety permit for an industrial water retention dam and reservoir shall include:

(A) Notification of completion of the starter dam or the initial phase of construction shall be prepared by or under the supervision of an experienced professional engineer and shall indicate that construction was performed in accordance with the provisions of the construction permit;

(B) Notification of the completion of construction and application for the first safety permit for the dam and reservoir shall be provided by the owner. The experienced professional engineer who was in responsible charge of the construction work shall certify that the construction was substantially in accordance with the approved plans and specifications. If revisions have been made which vary considerably from the provisions of the construction permit, it must be shown that the revisions do not endanger public safety, life or property. This subsection shall not be construed to excuse any person from the requirement to notify the council or chief engineer of modifications or revisions prior to commencing such actions and to obtain the required permits or authorization therefore;

(C) Notification of completion shall be within two (2) month's time after completion of construction; and

(D) As built drawings shall be submitted.

(3) Visits for the purpose of observation of operation and maintenance procedures may be made by the council, the chief engineer or member of their staff. Such visits will be at any reasonable time following reasonable notice, except that in the case of an emergency threatening public safety, life or property, no such notice shall be required, and inspection may be made at any time. Owners shall permit entry to

their property for such persons to perform such inspections.

Auth: sections 236.400, 236.405, 236.415, 236.420, 236.425, 236.440 and 236.465, RSMo (Supp. 1980). Original rule filed April 14, 1981, effective August 13, 1981. Revisions: Filed June 14, 1984, effective January 1, 1985.

**Title 10 — DEPARTMENT OF NATURAL RESOURCES
Division 22 — Dam and Reservoir Safety Council
Chapter 4 — Action Taken by Council and Chief Engineer**

10 CSR 22-4.010 Emergency Action

PURPOSE: The purpose of this rule is to define the way emergency action is taken.

(1) In performing his duties, the chief engineer shall determine by inspection whether a dam or reservoir constitutes a threat to public safety, life or property. If it is determined that a dam is in an advanced state of deterioration and in such condition that continued deterioration could cause failure of the dam, the chief engineer may classify the dam as dangerous to public safety, life or property. If the chief engineer or council further determines that there is not sufficient time to issue an enforcement order to the owner to correct the hazard, or to take other legal action, the chief engineer or council may take any appropriate action necessary for emergency protection of public safety, life or property. The type of action depends upon the state of progression of the deterioration, the physical layout of the dam, reservoir and inundation zone below the dam, and the resources available to the chief engineer or council at the time of the emergency.

(2) The chief engineer or council, upon determining that a dam or reservoir is dangerous and constitutes a substantial threat of failure may request the attorney general or a prosecuting attorney to take any legal steps necessary for the protection of public safety, life or property. Such action may be brought in any county where the defendant or defendant's principal place of business is located or where the dam or reservoir is located. Nothing in this section shall preclude the chief engineer or council from taking immediate action under 10 CSR 22-4.010(1) above with respect to any dam or reservoir that has been classified as dangerous to public safety, life or property.

Auth: sections 236.400, 236.405, 236.420, 236.425 and 236.455, RSMo. Original rule filed June 14, 1984, effective January 1, 1985.

10 CSR 22-4.020 Enforcement Orders and Enforcement Procedures

PURPOSE: The purpose of this rule is to identify the procedure to be taken for the issuance of enforcement orders.

(1) Enforcement orders shall be prepared by the chief engineer or council in cases where a dam or reservoir contains serious defects which pose a threat to public safety, life or property. Enforcement orders shall be sent to a dam owner by certified mail or served personally.

(2) If an owner does not initiate corrective actions to his dam and reservoir within thirty (30) days of the issuance of an enforcement order by the chief engineer or council, the council may request the attorney general or a prose-

cuting attorney to apply to the circuit court having jurisdiction to enforce compliance. Nothing in this section shall preclude the chief engineer from taking immediate action under 10 CSR 22-4.010(1) above with respect to any dam or reservoir he has classified as dangerous to public safety, life or property.

Auth: sections 236.400, 236.405, 236.410, 236.415, 236.445 and 236.450, RSMo. Original rule filed June 14, 1984, effective January 1, 1985.

REVISED STATUTES OF MISSOURI

CHAPTER 236

DAMS, MILLS AND ELECTRIC POWER

Dam and Reservoir Safety

236.400. Definitions. As used in sections 236.400 to 236.500, standards, rules and regulations promulgated hereunder, unless the context otherwise requires the following words and terms mean:

(1) **"Agricultural dam"**, any dam constructed to impound water for use in irrigation, livestock watering, or commercial fish rearing and sale;

(2) **"Alterations"**, **"repairs"**, or either of them, such alterations or repairs as affect the safety of a dam or reservoir, or public safety, life or property;

(3) **"Chief engineer"**, the head of the dam and reservoir safety program of the department of natural resources or his representative;

(4) **"Construction permit"**, a written authorization issued by the council giving the owner the right to construct, alter, enlarge, reduce, repair or remove a dam or reservoir or appurtenances thereto, with such conditions as are necessary to adequately protect the public safety, life, property, the dam or reservoir;

(5) **"Dam"**, any artificial or manmade barrier which does or may impound water, and which impoundment has or may have a surface area of fifteen or more acres of water at the water storage elevation, or which is thirty-five feet or more in height from the natural bed of the stream or watercourse measured at the downstream toe of the barrier or dam, if it is not across a streambed or watercourse, together with

appurtenant works. Sections 236.400 to 236.500 shall not apply to any dam which is not or will not be in excess of thirty-five feet in height or to any dam or reservoir licensed and operated under the Federal Power Act;

(6) **"Dam and reservoir safety council"**, as designed by sections 236.400 to 236.500 and referred to as the **"council"** shall consist of seven members appointed by the governor according to the provisions of sections 236.400 to 236.500;

(7) **"Director"**, the director of the department of natural resources of the state of Missouri;

(8) **"Enlargement"**, any change in or addition to an existing dam or reservoir which raises the height of a dam, increases the watershed for a reservoir, or raises the water storage elevation of the water impounded by a dam or reservoir;

(9) **"Experienced professional engineer"**, an engineer registered in the state of Missouri and experienced in hydraulics, hydrology and civil engineering as applied to dam design and construction;

(10) **"Maintenance"**, the proper keeping of all aspects of a dam or reservoir and appurtenances thereto, that pertain to safety, in a state of repair and working order as necessary to comply with sections 236.400 to 236.500, any permit hereunder, and protect public safety, life and property;

(11) **"Natural physical changes"**, those changes not directly or indirectly caused

by man which affect the safety of the dam or reservoir;

(12) **"Operation"**, the physical changes, natural or manmade that occur or are made to a dam or reservoir, or operation of the mechanisms or appurtenances of the dam or reservoir, which affect or may affect public safety, life or property;

(13) **"Owner"**, a person who owns, controls, operates, maintains, manages, or proposes to construct a dam or reservoir including:

(a) The state and its departments, institutions, agencies, and political subdivisions, but not the United States government;

(b) A municipal or quasi-municipal corporation;

(c) A district;

(d) A public utility;

(e) A natural person, firm, partnership, association, corporation, political subdivision, or legal entity;

(f) The duly authorized agents, lessees, or trustees of any of the foregoing;

(g) Receivers or trustees appointed by any court for any of the foregoing;

(14) **"Permit"**, a construction, safety or registration permit;

(15) **"Permit applicant"**, an owner who applies for a construction, safety or registration permit;

(16) **"Reduction"**, any decrease in the height of a dam, watershed size, or water storage elevation of the water impounded by a dam or reservoir;

(17) **"Registration permit"**, a permit issued for a period not to exceed five years by the council to the owner of a dam or reservoir in existence on September 28, 1979, or which becomes subject to the provisions of sections 236.400 to

236.500 for such dams and reservoirs which are in a properly maintained condition or which have made and complied with recommendations for corrections of observed defects of the dam or reservoir and have been* examined and approved in accordance with sections 236.400 to 236.500 and standards, rules and regulations and guidelines issued pursuant to sections 236.400 to 236.500;

(18) **"Reservoir"**, any impoundment which results from a dam as defined in sections 236.400 to 236.500;

(19) **"Safety permit"**, a permit issued to the owner for a period of five years, or less if safety considerations so require, by the council indicating that the dam meets the requirements of sections 236.400 to 236.500 and the guidelines, standards, rules and regulations issued pursuant to sections 236.400 to 236.500, and containing such conditions as to operations, maintenance and repair as are necessary to adequately protect public safety, life and the dam or reservoir;

(20) **"Water"**, water, other liquid or tailings;

(21) **"Water storage elevation"**, that elevation of water surface at the principal spillway which could be obtained by the dam or reservoir were there no outflow and were the reservoir full of water;

(22) **"Watershed"**, the area, usually expressed in acres or square miles, that contributes or may contribute surface water to a reservoir.

(L. 1979 H. B. 603 § 1)

* Words "have been" not in original rolls.

236.405. Employment of engineer and assistants-records.

1. There is hereby created a dam and reservoir safety program in the

department of natural resources. The council shall promulgate rules, regulations, guidelines, and standards relating to the determination of whether a dam or reservoir constitutes a danger to public safety, life or property to be effective upon approval by the director.

2. The director of the department of natural resources shall employ an experienced professional engineer as chief engineer and assistants to administer the activities of the dam and reservoir safety program.

3. The chief engineer shall be selected under the state merit system on the basis of professional experience directly related to the design and construction of dams and reservoirs.

4. The findings, opinions, and orders of the council and the chief engineer shall be kept as permanent public records in the offices of the department of natural resources.

(L. 1979 H. B. 603 § 2)

236.410. Council established-members, terms, qualifications, officers-meetings-quorum-compensation.

1. There is hereby created a "Dam and Reservoir Safety Council" whose domicile for the purposes of sections 236.400 to 236.500 shall be the department of natural resources of the state of Missouri, for the regulation of dam and reservoir safety. The council shall consist of seven members, no more than four of whom shall be members of the same political party, appointed by the governor with the advice and consent of the senate.

2. The members of the council shall have a background of academic training or professional experience directly related to the design of dams and reservoirs. At least two members of the

council shall be professional engineers registered in the state of Missouri, one of whom shall represent the general public; at least one member shall be an engineering geologist; at least one member, in addition to the professional engineer, shall be a representative of the general public, and three members shall be from industry, two of whom shall be earthmoving contractors. The members shall serve for a term of two years; except, of the first appointments three shall be appointed for one year. The governor shall fill any vacancy on the council and may remove any appointed member for cause. The council shall annually elect a chairman and vice chairman from among its members. The council shall meet regularly but not less than quarterly. Special meetings and hearings may be called upon delivery of written notice to each member of the council signed by the director, the chief engineer, the council chairman or four of the council members. Four members of the council shall constitute a quorum to transact the business of the council. The council shall decide all questions by a majority vote of those present and constituting a quorum. The members of this council shall not receive any compensations other than for actual travel and subsistence when acting officially as members of the council.

(L. 1979 H. B. 603 § 3)

236.415. Council's powers and duties-public hearings required-adoption of rules and regulations, procedure-suspension and reinstatement, procedure.

1. The council considering recommendations of the chief engineer shall, subsequent to a public meeting, adopt, subject to the approval of the director, the general technological guidelines and the standards, guidelines, rules and regulations applicable to permits, the design, construction, maintenance, operation, alteration, repair, enlarge-

ment, reduction, removal or natural physical changes that may occur to a dam or reservoir. Violations of guidelines, standards, rules and regulations are violations of sections 236.400 to 236.500 permitting the revocation, suspension, or refusal to issue any permit required by sections 236.400 to 236.500. No standards, guidelines, rules, or regulations shall be adopted, or any amendment or repeal thereof shall be effective, except after a public hearing to be held after thirty days prior notice by advertisement or press release, and publication as required in chapter 536, RSMo, of the date, time and place of the hearing and opportunity given to the public to be heard.

2. At the hearing, opportunity to be heard by the council with respect to the subject thereof shall be afforded any interested person upon written request to the council, addressed to the chief engineer, received not later than seven days prior to the hearing and may be afforded to other persons if convenient. In addition, any interested person, whether or not heard, may submit, within seven days subsequent to the hearings, a written statement of his views. The council may solicit the views, in writing, of persons who may be affected by, or interested in, proposed rules and regulations, standards or guidelines. Any person heard or represented at the hearing or making written request for notice shall be given written notice of the action of the council with respect to the subject thereof.

3. The council upon hearing the recommendations of the chief engineer and reviewing the application for a construction or registration permit shall approve or deny the permit application. The council may delegate authority to approve or deny permit applications to the chief engineer, whose actions shall be subject to appeal to the council as

provided in subsection 2 of section 236.425.

4. No standard, rule or regulation or guideline, or amendment or repeal thereof, adopted by the council shall be in force and effect until it has been approved in writing by the director and the requirements of chapter 536, RSMo, are satisfied. The affirmative vote of at least four members of the council shall be required for adoption. Any rule or portion of a rule promulgated pursuant to sections 236.400 to 236.500 may be suspended by the joint committee on administrative rules if after hearing thereon the committee finds that such rule or portion of the rule is beyond or contrary to the statutory authority of the agency which promulgated the rule, or is inconsistent with the legislative intent of the authorizing statute. The general assembly may reinstate such rule by concurrent resolution signed by the governor.

(L. 1979 H. B. 603 § 4)

236.420. Inspection of dams and reservoirs, when-report on conditions. The council, with the advice and assistance of the chief engineer, shall carry out a state program of inspection of dams and reservoirs in accordance with regulations adopted by the council. All dams and reservoirs in this state shall be inspected on a periodic basis to determine if they constitute a threat to public safety, life or property. The chief engineer shall submit reports to the director and the council concerning the condition of each dam or reservoir inspected, and recommendations as to any alterations or repairs needed.

(L. 1979 H. B. 603 § 5)

236.425. Chief engineer's duties-search warrants-council to hear certain appeals.

1. The chief engineer shall

administer the provisions of sections 236.400 to 236.500 by:

(1) Recommending general technological guide lines that pertain to the design, construction, maintenance, operation, use, alteration, repair, enlargement, reduction, or natural physical changes of, or that may occur to, a dam or reservoir including their removal; except that, detailed technical specifications shall not be promulgated to regulate the design, construction, operation, maintenance, use, alteration, repair or removal of a dam or reservoir. Such guidelines shall not be effective until adopted by the council and approved by the director at a public meeting, after notice requirements set forth in subsection 1 of section 236.415 herein have been satisfied;

(2) Making* recommendations concerning the issuing, continuing in effect, revoking, modifying, suspending, or denying, under such conditions as prescribed by sections 236.400 to 236.500 and such rules as may be adopted to protect public safety, life, property, dams and reservoirs, construction permits for the construction, alteration, enlargement, reduction, repair or removal of dams or appurtenances thereto, and safety and registration permits to insure continuing protection of public safety, life, property, dams and reservoirs, for all dams subject to the provisions of sections 236.400 to 236.500;

(3) Making such investigations, including hearings, as are proper to protect public safety, life and property from an unsafe dam or reservoir, and to determine whether any permits should be issued, continued, revoked, modified, suspended, or denied or whether any violations of sections 236.400 to 236.500, standards, or rules or regulations have occurred or are occurring;

(4) Entering, at any reasonable time, any private or public premises as necessary to make an investigation or inspection of a dam or reservoir, or

records kept, pertaining thereto, and such inspection shall follow reasonable notice to the owner given prior to such investigation or inspection except in the case of an emergency threatening public safety, life or property, in which case such inspection or investigation may be made without prior notice. A suitably restricted search warrant, upon a showing of probable cause in writing and upon oath, shall be issued by any judge or magistrate having jurisdiction, to the chief engineer or his representative for the purpose of enabling him to make the inspection.

2. The council shall meet with or hear the appeal of a permit applicant and his representative upon request of the permit applicant if the chief engineer has rejected the application for a construction, safety or registration permit.

(L. 1979 H. B. 603 § 6)

* Words "To make" appear in original rolls.

236.430. Employees, council to provide for. The council shall retain, employ, provide for and compensate within appropriations available therefore, such consultants, assistants, and other employees on a full- or part-time basis as may be necessary to carry out the provisions of sections 236.400 to 236.500 and prescribe the times at which they shall be appointed and their powers and duties.

(L. 1979 H. B. 603 § 7)

236.435. Permits required, when, procedure to obtain—chief engineer to make recommendation—exemptions—plans to be filed.

1. Prior to the commencement of the construction, alteration, enlargement, reduction or removal of a dam or reservoir, the owner shall apply to the council and upon satisfying the requirements of sections 236.400 to 236.500 and the rules, regulations and standards

promulgated pursuant hereto, obtain a construction permit.

2. The application for a construction permit shall bear the seal and signature of an experienced professional engineer registered in Missouri or employed by a qualified engineering division of a state or federal agency regularly engaged in dam construction for soil and water conservation, or irrigation or relating to wildlife conservation and shall be accompanied by the design report and plans and specification of the proposed design, alteration, enlargement, reduction, repair or removal of the dam or reservoir.

3. Any person constructing or owning a dam or reservoir, or living or owning property in an area affected, or whose safety may be affected by such dam or reservoir may consult with the chief engineer concerning such dam or reservoir.

4. The council upon hearing the recommendation of the chief engineer shall approve or deny an application for a construction permit within forty-five days after its receipt or the completion of any hearings in connection with such application, whichever is later. The permit shall be issued upon the receipt of the application if, in the judgement of the council, requirements of sections 236.400 to 236.500 and all standards, rules and regulations hereunder are satisfied and the design will be adequate to protect the public safety, life and property.

5. The council upon hearing the recommendation of the chief engineer may reject the application if it decides that there is insufficient information to determine the safety of the proposed construction, alteration, enlargement, reduction or removal of the dam or reservoir or that the construction,

alteration, enlargement, reduction or removal of the dam or reservoir would endanger public safety, life or property, or otherwise not comply with sections 236.400 to 236.500 and any rules, standards, guidelines and regulations adopted hereunder.

6. A landowner who now owns or proposes to construct an agricultural dam or reservoir which will be used primarily for agricultural purposes will be exempt from all provisions of sections 236.400 to 236.500. If the council with the advice of the chief engineer, determines that the dam or reservoir is no longer used primarily for agricultural services, it shall become subject to the provisions of sections 236.400 to 236.500.

7. Dams or their construction, alterations, enlargements, reductions or removals designed by, and their construction, alteration, enlargement, reduction or repair or removal monitored by, a qualified engineer regularly engaged in dam construction for soil and water conservation or irrigation or relating to wildlife conservation are for the purposes of such construction or other listed actions exempt from the provisions of this section except that the plans for the dam shall be filed with the chief engineer prior to construction, or other listed action. Amended plans shall be filed at the completion of construction or other listed action if there have been significant deviations from the previously filed plans.

(L. 1979 H. B. 603 § 8)

236.440. Owner to notify council, when-council to issue safety permit-registration of existing dams, when-violations.

1. The owner shall notify the council upon completion of construction, alteration, enlargement, or reduction of the

dam or reservoir. This notification shall bear the seal and signature of an experienced professional engineer and shall be accompanied by an application for a safety permit. The owner of any dam or reservoir subject to the provisions of sections 236.400 to 236.500 shall obtain a safety permit following completion of construction.

2. Upon receipt of complete and proper application for a safety permit, including notification of completion by the owner and certification by an experienced professional engineer that the new construction, alteration, enlargement or reduction has been completed in accordance with the provisions of the construction permit and sections 236.400 to 236.500, the council shall upon receipt of the application issue a safety permit. The council upon advice of the chief engineer may deny the application if it determines that violations of the construction permit or sections 236.400 to 236.500 exist. If revisions have been made which vary substantially from the provisions of the construction permit, it must be shown that the revisions do not endanger public safety, life or property. The safety permit for dams constructed pursuant to a construction permit issued under sections 236.400 to 236.500, may contain conditions the council upon advice of the chief engineer determines are necessary for the protection of public safety, life and property and a schedule and timetable for the dam and reservoir to achieve compliance with the construction permit and provisions of sections 236.400 to 236.500, standards, rules and regulations promulgated hereunder, but such conditions shall not be more stringent or restrictive than those contained in the construction permit.

3. Owners of dams and reservoirs in existence on September 28, 1979, shall obtain registration permits for dams of fifty to seventy feet in height within

four years, and for dams up to fifty feet in height within six years of September 28, 1979, or as otherwise required by the provisions of sections 236.400 to 236.500 and rules and regulations adopted hereunder. A registration permit shall be issued by the council upon the advice of the chief engineer for dams and reservoirs only after it is determined that the dam meets the standards of sections 236.400 to 236.500 and rules and regulations hereunder, and any recommendations made by the inspecting engineer pursuant thereto.

4. Upon complete and prior application for a registration permit, on forms provided by the department of natural resources, by the owner of a dam in existence upon September 28, 1979, including a certification by an experienced professional engineer or an engineering division of a state or federal agency regularly engaged in dam construction for soil or water conservation, irrigation, or relating to wildlife conservation, that the dam has been inspected in accordance with sections 236.400 to 236.500, standards, rules and regulations and guidelines promulgated hereunder, and that the owner has complied with the inspecting engineer's or agency's recommendations necessary to correct observed defects of the dam or reservoir, the council shall, upon receipt of the application, issue a registration permit. The council upon hearing the recommendations of the chief engineer may deny the application if it determines that the owner has not complied with the inspecting engineer's or agency's recommendations.

5. For dams for which construction was completed prior to the effective date of the construction permit requirements hereunder, the registration permit may contain conditions the council upon hearing recommendations of the chief engineer determines to be necessary to

bring the dam and reservoir into compliance with sections 236.400 to 236.500 and standards, rules and regulations promulgated hereunder.

6. If a dam or reservoir has been removed by the owner, the council shall issue a final approval upon notification by the owner and receipt of certification by an experienced professional engineer that the removal has been carried out in accordance with the provisions of the construction permit issued for such removal. Failure to obtain final approval shall be a violation of sections 236.400 to 236.500.

7. The council shall issue safety permits for dams or their construction, alterations, enlargements, reductions or removals designed by, and their construction or other listed actions monitored by, a state or federal agency engaged in dam construction for soil and water conservation, irrigation or relating to wildlife conservation provided the owners obtain from such agency and file with the chief engineer a statement upon completion of the construction or other listed actions and at not greater than five year intervals, and with every application for renewal of a safety permit, that the dam conforms to the plans on file with the chief engineer and is in a safe, properly maintained condition.

8. The owner shall apply for renewal of a safety or registration permit not less than sixty days prior to expiration of the previously issued permit. The chief engineer shall determine if the dam and reservoir are essentially as described in the latest permit issued for that dam and reservoir, whether they satisfy the requirements of sections 236.400 to 236.500 and any rules, regulations, standards and guidelines adopted pursuant to sections 236.400 to 236.500 and whether any inspection conducted in connection with the permit renewal reveals any

defect in the dam or reservoir which would threaten public safety, life or property. Unless the chief engineer determines that the dam and reservoir are not properly maintained, do not satisfy the requirements of the permit, act* or rules, regulations, standard, and guidelines promulgated hereunder, or that defects revealed by the inspection are not corrected, the council upon hearing the recommendations of the chief engineer shall issue or renew the safety or registration permit upon forty-five days of the receipt of a complete and proper application. The council may require the owner to furnish a certification, as a part of an application to renew a permit hereunder, by an experienced professional engineer or a qualified engineering division of a state or federal agency regularly engaged in dam construction for water conservation, irrigation or relating to wildlife conservation that the dam is in a properly maintained condition and that any recommendation for correction of defects which violate sections 236.400 to 236.500, guidelines, rules, regulations and standards hereunder or which threaten public safety, life or property have been complied with and that the engineer detected no other such defects which have not been corrected.

9. If a barrier or water impoundment becomes a dam or reservoir through alteration or enlargement as defined herein, it shall be subject to the provisions of sections 236.400 to 236.500.

10. Failure to obtain and comply with a permit as required in this section is a violation of sections 236.400 to 236.500.

(L. 1979 H. B. 603 § 9)

* Word "act" apparently refers to "this act", now §§ 236.400 to 236.500.

236.445. Permit may be suspended-alteration or removal may be required-violation.

1. If it is found that a dam or reservoir presents a threat to public safety,

life or property, or that the safety of the dam or reservoir is threatened, the permit for the dam or reservoir shall be suspended and shall be reinstated only when the owner at his expense has completed the necessary alteration or has established such operational procedures as the council upon hearing the recommendations of the chief engineer deems necessary for protection of the public safety, life, property, the dam or reservoir. If necessary for such protection, the council may require the owner at his expense to remove the dam or reservoir, or if the owner refuses or neglects to act, the state may alter or remove the dam or reservoir, and the chief engineer may recover the costs of such action as provided in section 236.450.

2. If the owner refuses to alter or remove a dam or reservoir as directed when found to be a threat as set forth in sections 236.400 to 236.500, he shall be in violation of sections 236.400 to 236.500 and the permit requirements hereunder, and such action shall subject the owner to the enforcement provisions contained herein and revocation of the permit.

(L. 1979 H. B. 603 § 10)

236.450. Removal or repair of abandoned dam-recovery of expenses. An existing dam or reservoir which the chief engineer determines to be abandoned and considered to be a threat to public safety, life, or property may be altered, repaired, or removed upon such determination at the expense of the state of Missouri, and the chief engineer may request either the attorney general or a prosecuting attorney to bring an action in the name of the people of the state of Missouri to recover such expenses from the owner through appropriate legal processes. Such action may be brought in any county where the defendant or defendant's principal place of business is

located or where the dam or reservoir is located.

(L. 1979 H. B. 603 § 11)

236.455. Emergency action authorized. If it is determined at any time that the condition of a dam or reservoir is an imminent and substantial threat, and so dangerous to public safety, life or property as not to permit time for issuance of an enforcement order to correct the hazard, the chief engineer may take any appropriate action not prohibited by the constitution or laws of this state he deems necessary for emergency protection of public safety, life or property, and may request the attorney general or a prosecuting attorney to take any legal steps necessary to accomplish such action and to recover the cost of such measures from the owner by appropriate legal action.

(L. 1979 H. B. 603 § 12)

236.460. Transfer of ownership, notice required. The owner shall notify the chief engineer upon the sale or other transfer of interest in a dam or reservoir, either existing or under construction, alteration or removal. The construction, safety or registration permit shall be transferred to the successive owner upon receipt of this notification and upon determination that such transfer will not endanger public safety, life, property, the dam or reservoir.

(L. 1979 H. B. 603 § 13)

236.465. Industrial water retention structures subject to provisions of sections 236.400 to 236.500-inspection-changes. Irrespective of any other provisions of sections 236.400 to 236.500, the following provisions shall apply to the construction, alteration or enlargement of tailing, slime and settling ponds and to other similar industrial water retention structures included within the definitions of dam or reservoir in section 236.400:

(1) Applications for construction, safety or registration permits shall be submitted as provided in section 236.435 and section 236.440 except that design plans and specifications which outline any anticipated enlargement of the industrial water retention structure shall be included;

(2) It shall not be necessary to reapply for a permit each time the structure is enlarged if the enlargement plans have been submitted in and approved with the original application, and the provisions of subdivision (3) of this section have been satisfied;

(3) Upon notification of the chief engineer, bearing the seal and signature of an experienced professional engineer, that the initial phase of construction has been completed in accordance with the provisions of the construction permit and sections 236.400 to 236.500, or if a registration permit has been issued as provided in subdivision (1) of this section, and before any enlargement is begun, and if no violation of sections 236.400 to 236.500 can be shown, a safety permit or a registration permit with special provisions that authorize the planned enlargement to the initially constructed structure shall be issued, on application, if enlargement plans were included and approved in the original application;

(4) It is not necessary to retain continuously a professional engineer after the initial state of construction;

(5) The dam shall be inspected by an experienced professional engineer registered in the state of Missouri as required to renew the safety permit or registration permit at five-year intervals unless safety of the public, life and property require a shorter period of time;

(6) The chief engineer shall make inspections of these structures as necessary to insure adequate protection for public safety, life and property;

(7) Where it is shown that a tailings, slime and settling pond, or other

similar water retention structure is subject to inspection for safety, using standards at least as stringent as those required under sections 236.400 to 236.500, by a federal or state agency and the owner notifies the council that the structure is subject to such inspection, such structures shall be exempt from the provisions of sections 236.400 to 236.500.

(L. 1979 H. B. 603 § 14)

236.470. Conduct of hearings-subpoenas-approval of final orders.

1. At any public hearing all testimony taken before the council, or a hearing officer appointed by the council chairman, shall be under oath and recorded stenographically. The transcript so recorded shall be made available to any person upon payment of the usual charge therefore.

2. In any such hearing, any member of the council or the hearing officer shall issue in the name of the council notice of hearing and subpoenas. Subpoenas shall be issued and enforced as provided in section 536.077, RSMo. The rules of discovery that apply in any civil case apply to hearings held by the council.

3. All hearings to approve, amend or repeal guidelines, standards or rules and regulations shall be held before at least four members of the council.

4. All other hearings may be held before one council member designated by the council chairman or a hearing officer who shall be a member of the Missouri bar and appointed by the council chairman. The hearing officer or council member shall preside at the hearing and hear all evidence and rule on the admissibility of evidence. The hearing officer or council member shall make recommended findings of fact and

may make recommended conclusions of law to the council.

5. All final orders or determinations or other final actions by the council shall be approved in writing by at least four members of the council. Any council member approving in writing any final order or* determination or other final action, who did not attend the hearing, shall do so only after reviewing all exhibits and reading the entire transcript.

(L. 1979 H. B. 603 § 15)

* Word "of" appears in original rolls.

236.475. Immunity of officers. In the absence of willful and wanton misconduct, no action shall be brought against the council, the chief engineer or his agents, or department employees or private individuals employed as consultants by the department for the recovery of damages caused by the partial or total failure of any dam or reservoir or through the use or operation of any dam or reservoir upon the ground that such person is liable by virtue of any of the following:

(1) The approval of a dam or reservoir or permits therefore;

(2) The issuance or enforcement of orders relating to maintenance, operation or repair of a dam or reservoir;

(3) Control and regulation of a dam or reservoir;

(4) Measures taken to protect against failure during an emergency.

(L. 1979 H. B. 603 § 16)

236.480. Judicial review of actions-administrative review required-interpretation of administrative actions.

1. All final decisions, orders, actions or determinations made pursuant to the provisions of sections 236.400 to 236.500 are subject to judicial review pursuant to the provisions of chapter 536, RSMo. No

judicial review shall be available, however, until all administrative remedies are exhausted.

2. In any suit filed pursuant to section 536.050, RSMo, concerning the validity of the standards, rules, guidelines and regulations promulgated hereunder, the court shall review the record made pursuant to their adoption to determine the validity and reasonableness of such standards, rules, guidelines and regulations and may hear such additional evidence as it deems necessary.

(L. 1979 H. B. 603 § 17)

236.485. Water rights preserved. The provisions of sections 236.400 to 236.500 do not grant or diminish any right to that water entering, discharged from or impounded by a dam or contained in a reservoir.

(L. 1979 H. B. 603 § 18)

236.490. Enforcement of act. All duly constituted officers of the law of this state or any political subdivision thereof shall aid in the enforcement of the provisions of sections 236.400 to 236.500.

(L. 1979 H. B. 603 § 19)

236.495. Legal actions for enforcement available, procedure.

1. In carrying out the provisions of sections 236.400 to 236.500 and to the extent no inconsistent with chapter 491, RSMo, the chief engineer or council may subpoena witnesses and compel their attendance, and may also require the submission of books, papers, documents or other pertinent data in any hearings or enforcement proceedings hereunder or in any case wherein a violation of this chapter is alleged. Upon failure or

refusal to comply with such order or upon failure to honor a subpoena, as herein provided, the council may request the attorney general or a prosecuting attorney to apply to the circuit court having jurisdiction to enforce compliance.

2. The council may request the attorney general or a prosecuting attorney, in the name of the state, to institute a suit for injunctive relief to stop or prevent violations of the provisions of sections 236.400 to 236.500, permits, standards, orders and rules and regulations promulgated hereunder, which shall be violations of sections 236.400 to 236.500, or to restrain any violation thereof, or after written notification of violation by the council, and a reasonable time to correct such violation, for the assessment of a penalty of up to one thousand dollars per day, for each day or part thereof the violation continues to occur after such notice. Such action may be brought in any county where the defendant's principal place of business is located, where the dam or reservoir is located, or the violation does or may occur.

(L. 1979 H. B. 603 § 20)

236.500. Penalties.

1. Any person who willfully violates any of the provisions of sections 236.400 to 236.500 is guilty of a misdemeanor and, upon conviction, shall be punished

by a fine of not less than five hundred dollars nor more than ten thousand dollars, or by confinement in the county jail for a term of not less than thirty days nor more than one year, or by both such fine and confinement.

2. In the event of a continuing violation, each day that the violation continues shall constitute a separate and distinct offense.

3. Any person who willfully obstructs, hinders or prevents the council, the chief engineer or his agents or employees from performing the duties imposed by sections 236.400 to 236.500 and rules and regulations promulgated hereunder or who willfully resists the council, the chief engineer or his agents in the performance of the duties imposed on them by sections 236.400 to 236.500 and rules and regulations promulgated hereunder is guilty of a misdemeanor and, upon conviction, shall be punished as provided in subsection 1 of this section.

4. Any owner who willfully engages in the construction, repair, alteration or removal of any dam or reservoir without a construction permit or in violation of a construction permit or willfully violates the requirements of or for a safety or registration permit is guilty of a misdemeanor and, upon conviction, shall be punished as provided in subsection 1 of this section.

(L. 1979 H. B. 603 § 21)

MISSOURI DEPARTMENT OF NATURAL RESOURCES

DIVISION OF GEOLOGY AND LAND SURVEY

James H. Williams, Ph.D., Director and State Geologist

*Jerry D. Vineyard, M.A., Assistant Director for Geological Survey and Water Resources

Robert E. Myers, P.E., L.S., Assistant Director for Land Survey and Dam Safety

*Wallace B. Howe, Ph.D., Assistant Division Director

ADMINISTRATION AND GENERAL SUPPORT

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Susan C. Dunn, B.F.A., Artist II
Billy G. Ross, Artist II
Phillip Streamer, Artist I

GEOLOGY AND WATER

*Jerry D. Vineyard, M.A., Asst. State Geologist and Program Director
Sharon Krause, Clerk-Typist II

GEOLOGICAL SURVEY

Engineering/Environmental Geology

Thomas J. Dean, B.S., Chief
James W. Duley, B.S., Geologist III
James Vaughn, B.S., Soil Scientist III
Gary St. Ivany, B.A., Geologist II
Peter Price, B.S., Geologist II
Charles Williams, E.I.T., Geologist II
James C. Brown, Jr., B.S., Geol. II
Mimi Garstang, B.S., Geologist II
David Hoffman, M.S., Geologist I
Ben Pendleton, B.S., Eng. Tech. I
Janny Sherman, Eng. Tech. I
Deborah Breuer, Clerk-Steno III

Geological Investigations

Charles E. Robertson, M.A., Chief
*James A. Martin, M.S., Geologist IV
Thomas L. Thompson, Ph.D., Geol. IV
Eva B. Kisvarsanyi, M.S., Geologist III
John W. Whitfield, B.A., Geologist III
*David C. Smith, B.S., Geologist III
Mark Middendorf, B.S., Geologist II
James Palmer, B.S., Geologist II
David Work, B.S., Geologist II
Gregory M. Lovell, Chemist I
Myrna Reiff, B.S., Eng. Tech. I
Kathryn Adamick, Clerk-Steno II

Economic Geology

Ira R. Satterfield, M.S., Chief
Heyward Wharton, M.A., Geol. III
Ardel W. Rueff, B.A., Geologist III
Bruce Netzler, M.S., Geologist III
Ken Deason, B.S., Geologist II
Joy L. Bostic, B.S., Geologist II
Larry Nuelle, M.S., Geologist II
Greg Eason, M.S., Geologist II
Kim Haas, Geol. Tech. I
Kurt Hildebrandt, B.S., Eng. Tech. I
Mike McFarland, B.S., Geologist II
Jerry Plake, Lab. Tech.
Hairl Dayton, Jr., Lab. Tech.
Lois Miller, Clerk-Typist III
Rita Brasure, Clerk-Typist II

WATER RESOURCES

Research

Don E. Miller, M.S., Chief
James Vandike, M.S., Geologist III
Mark Marikos, M.S., Geologist II
Artney Lewis, B.S., Geologist II
Rex Bohm, B.S., Geologist II
Donald Hammer, B.S., Planner III
Donley Jones, B.S., Eng. Tech. I
Gary Penny, Eng. Tech. I
Cynthia Endicott, B.S., Geologist I
D. Jean Hale, Clerk IV
Beth Marsala, Clerk-Typist II
Mary Jo Horn, Clerk-Typist II

Planning

Robert Dunkeson, M.A., Planner IV
Charles Michael, B.A., Planner II
Jeanette Barnett, B.S., Planner I
Elaine Luebbert, Clerk-Typist II

LAND SURVEY AND DAM SAFETY

Robert E. Myers, P.E., L.S., State Land Surveyor and Program Director

LAND SURVEY

Norman L. Brown, P.E., L.S., Project Surveyor
Robert L. Wethington, P.E., L.S., Project Surveyor
John D. Paulsmeyer, L.S., Project Surveyor
+J. Michael Flowers, L.S., Project Surveyor
O. Dan Lashley, L.S., Project Surveyor
+Bruce D. Carter, Land Survey Tech. II
Michael Lloyd, Land Survey Tech. II
Michael Cape, Eng. Tech. I
Jack C. McDermott, County Surveyor Coord.

James L. Matlock, Microfilm Tech.
Diane R. Hess, Microfilm Records Tech.
Ruth Allen, Corner Registration Clerk
Bruce Wilson, Drafter
Glenda Henson, Clerk-Steno III
Linda Miller, Clerk-Typist III
Jane Lea, Clerk-Typist II
Terry Campbell, Clerk-Typist I
Terry Brenner, Clerk II

DAM AND RESERVOIR SAFETY

Brian J. Swenty, P.E., Chief Engineer
Russell C. Adams, P.E., Engineer
James L. Alexander, P.E., Engineer
Robert A. Clay, P.E., Engineer
Ralph P. Hess, Eng. Tech. III
Marge Paulsmeyer, Clerk-Typist II

*Certified Professional Geologist
+Assigned to DGLS

P.O. Box 250
Rolla, MO 65401
314-364-1752